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The Physiotherapy Review

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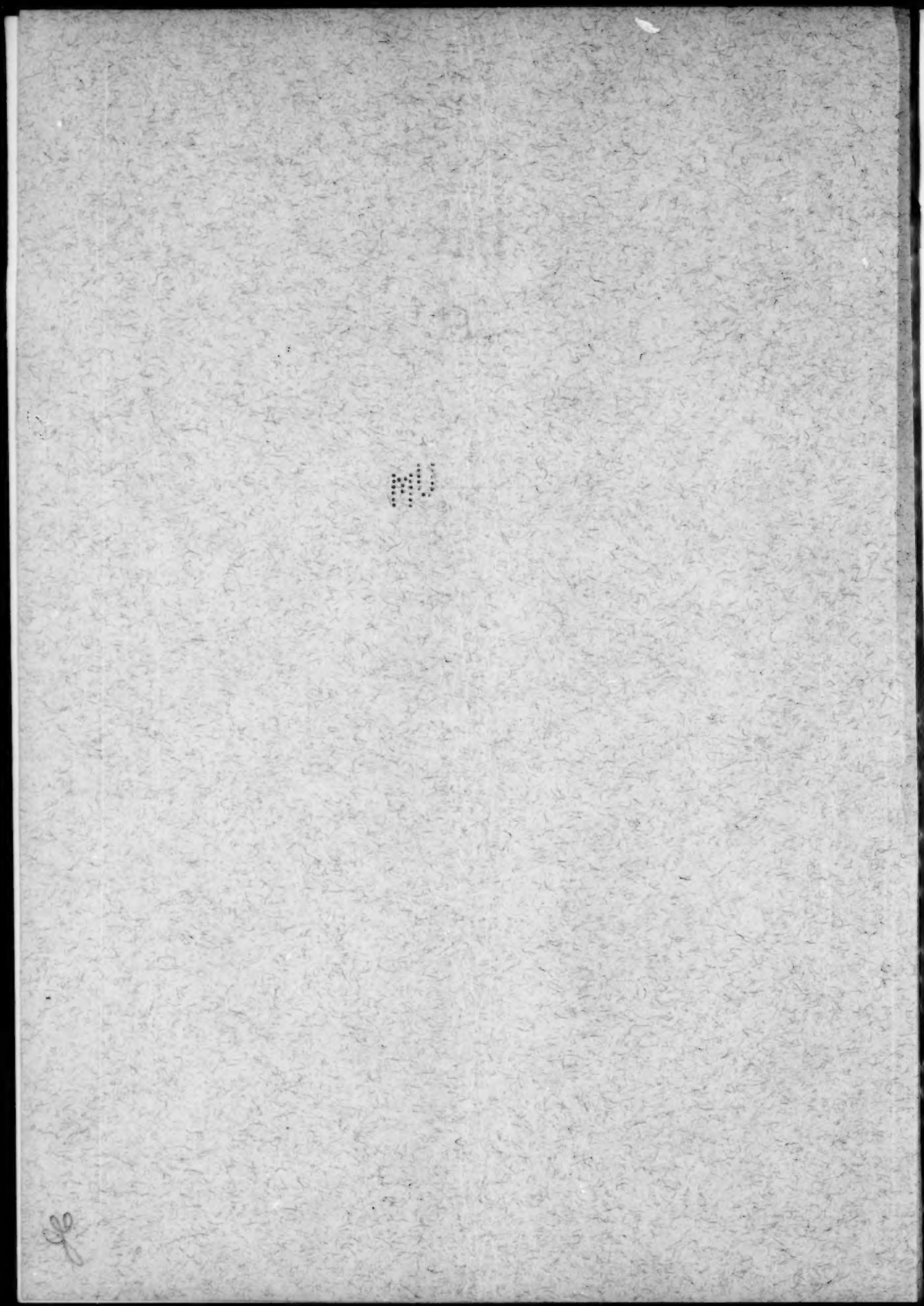

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Editor-in-Chief: DOROTHEA M. BECK, 69 Orange Rd., Montclair, N. J.

Associate Editor: IDA MAY HAZENHYER 719 Barry Ave., Chicago, Ill.

General Manager: GERTRUDE BEARD, 2449 S. Dearborn St., Chicago, Ill.

Address all correspondence for publication to the Editor.

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Considerations in the Treatment of Periarthritis of the Shoulder

By James A. Dickson, M.D, Cleveland Clinic, Cleveland, Ohio

An analysis of 200 cases of periarthritis of the shoulder and a review of the literature on this subject suggest that there must be some general physiologic disturbance that is responsible for this very distressing and common malady. This should be emphasized because this fact seems to have been lost sight of by many workers in their enthusiasm for one particular type of treatment, or in their zealous endeavor to attribute symptoms to some particular etiologic factor. I have found in all cases that whether the evidence pointed to infection, metabolic disturbances or trauma as the important etiologic factor; whether the treatment stressed was eradication of foci, physical measures, manipulation or operation, that the time required for recovery and the total duration of the disease were remarkably constant throughout.

In an effort to elucidate the relationship of trauma, foci of infection and metabolic factors in the etiology of periarthritis of the shoulder and to determine the most efficacious treatment for this condition, I have analyzed a series of 200 cases that have come under our care during the last nine years. I realize that we may be treading on thin ice when we use the term "periarthritis of the shoulder" but it appears to me that this better describes the clinical entity than "painful shoulder," "subdeltoid bursitis," "subacromial bursitis" or "calcifications of the supraspinatus tendon" with which names you are all familiar.

It would appear that the syndrome represents a complex pathologic state in which the capsule ligaments and tendons about the shoulder joint are involved.

Periarthritis of the shoulder is a distinct entity and presents a clinical syndrome that is more or less constant. The complaints are largely of pain and loss of function. The patient relates a history that he has developed pain in his shoulder either with or without an injury. The pain may be characterized by aching, with sharp, stabbing pain in certain limited motions, or it may be so severe that morphine is required for its control. The pain usually is felt a few inches above the insertion of the deltoid and often continues in the nature of a neuralgia down the outside of the arm to the hand. There is no alteration in sensation or in the reflexes and the nerve trunks are not tender on palpation. The limitation of motion in periarthritis of the shoulder is quite characteristic. Abduction is possible to about 45 degrees; rotation, both internal and external, is possible to about 50 per cent of normal while forward and backward movement is not limited and is painless. In some cases, abduction is painful only when the arm is passing through the arc from 70° to 90°, while abduction beyond the right angle can be accomplished without discomfort. There is a similar experience when the arm is lowered. Usually there is little change in the contour of the shoulder but atrophy, both in the deltoid and supraspinatus

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regions, is present in the chronic cases. Except in the very acute cases, muscle spasm does not occur until the movements are checked by painful adhesions.

Only cases showing this typical clinical syndrome were used for this analysis. The only joint symptoms were limited to the shoulders and no cases in which there was associated multiple arthritis were considered. All cases of periarthritis of the shoulder following definite dislocation and fracture about the shoulder or after severe injury with complete tearing of the supraspinatus tendon, as described by Codman, purposely were omitted from this study. The clinical picture is that of the patient who presents himself with the typical disturbance in the shoulder and who gives a history of no injury or if there has been injury, one such as "excessive work in the garden," "washing windows," or a slight twist after "throwing a baseball" or "playing golf" is given as a causative factor of his disability. In these cases there is always a question as to whether or not the alleged accident had anything to do with the condition found in the shoulder.

In all cases in this series the thorough routine examination included roentgenogram of the involved shoulder, detailed search for foci of infection, routine blood and urine examination and whatever special tests were indicated.

This study has shown that the clinical syndrome is not influenced in any respect by the presence or absence of calcium deposits as demonstrated radiologically. The presence of calcium is no indication of the severity or of the duration of the symptoms. Analysis of table 1 indicates that calcium deposits occur in 36.5 per cent of cases or approximately one in three.

Periarthritis is found as often in males as in females and appears after the age of forty years in over 80 per cent of the cases, and the right shoulder is involved more frequently than the left. The disease often is bilateral.

Table 2 shows that, of the 200 patients with periarthritis of the shoulder, only sixty-seven gave a history of trauma. However, in fifty of these, examination revealed some focus of infection or toxic element that might have been a contributing factor. Of the total number, 176 with focal infections, fifty had had some trauma, ninety-six showed only a focus of infection, and in thirty there were also definite metabolic irregularities. In two, metabolic abnormalities only were found while in five no etiologic factor could be elicited.

This analysis indicates that foci of infection and glandular dysfunction would appear to be much more important than trauma as etiologic factors, although it is extremely difficult to evaluate their true significance. Calcium deposits are found in approximately the same percentage in all the groups regardless of whether traumatic, infectious or glandular factors predominated, which shows that there is some common underlying alteration in the physical state that must determine the deposition of calcium. Brichner in 1917 suggested some metabolic fault as an etiologic factor. Nevertheless, whatever the general factors, there must be some local disturbance which predisposes to the formation of these calcium deposits about the shoulder.

The treatment of periarthritis of the shoulder has been approached from two angles—the general treatment of the patient and the local treatment of the shoulder.

The general treatment consisted in removal of all foci of infection, in the teeth, tonsils, prostate, and in every way attempting to bring the patient to a normal state of metabolism. The importance of treating the general metabolic condition of the patient was very strikingly emphasized during the observation of several cases of periarthritis of the shoulder in patients who were being treated for severe hyperthyroidism. The results of treatment of the local condition in the shoulders by the various forms of physical therapy and the preoperative regimen which included complete rest in bed and the administration of Lugol's solution were extremely disappointing and the patients failed to manifest anything but mild improvement. On the other hand, after thyroidectomy there was almost invariably extremely marked relief of the joint symptoms within forty-eight to seventy-two hours. The intense pains subsided rapidly and with further use of physical methods there was a complete return to normal function. Both hyperthyroidism and hypothyroidism have been encountered in this series of cases; the first was treated by operation and the latter with thyroid extract. Coincident hyperglycemia has been corrected by means of a typical diabetic regimen. Dietary regulation was insisted upon and, unless it was contraindicated, the patients were given a high vitamin, low carbohydrate diet. Heliotherapy has proved extremely beneficial. Several of the patients showed very little improvement with local measures until they began to acquire a coat of tan.

One patient had failed to respond to local and general measures, but showed marked improvement within three weeks after arrival in Florida, where she spent much time in the sun. Two other patients were unemployed and hence could not afford the usual physical therapeutic measures, but improved rapidly with no treatment except a daily sun bath on the beach.

The local treatment has varied somewhat according to the severity of the symptoms, but following is a typical regimen to which our patients are subjected. During the acute stage with severe pain and possibly muscle spasm, rest of the shoulder is advised. The arm is maintained in moderate abduction and external rotation by means of traction.

The position of full abduction and external rotation recommended by many has no particular advantage and is likely to add to the patient's discomfort. Ice caps are applied to the shoulder. Cold applications are more efficacious in the acute stage, as any form of heat seems to increase the pain definitely. On the third day sedative diathermia is given and the arm is passively moved (once only) through the full range of abduction and internal and external rotation and is then fixed again in the original position. This treatment must be carried out cautiously, for if motion is started too soon it will increase the reaction about the joint. On the other hand, if the arm is kept too long in fixation the exudate becomes organized with the formation of adhesions. The above treatment is carried out daily and voluntary contraction of the deltoid and other muscles is encouraged to the point of pain. This movement is beneficial while movement beyond this point, either active or passive, is detrimental.

As the range of voluntary movement without pain increases, the degree of passive abduction is gradually increased until full active abduction is possible without discomfort. The abduction splint is then discarded and full voluntary movements are encouraged until full function is restored.

In the subacute cases the arm is protected on an abduction splint and the patient is given treatment with diathermia, usually on alternate days. In 1923, I reported very satisfactory results with diathermia in periarthritis of the shoulder and similar experiences were reported

by Mumford. If, with the aid of diathermia and active and passive stretching exercises, there persists limitation of range of motion in the joint, manipulation of the shoulder under anaesthesia should be seriously considered. I agree with Perkins that the most satisfactory results from manipulative treatment are obtained in the group of cases due definitely to trauma. However, manipulation has a very definite place in the treatment of selected cases of the group under consideration. When the acute symptoms have subsided and the general treatment is adequate, if limitation of range of movement persists on account of strong adhesions which have formed, a great deal of convalescing time can be saved for the patient by breaking these adhesions by manipulation.

Very gratifying and satisfactory results have been obtained by the adoption of the above principles. It has been demonstrated that the calcium deposits are quite unstable and readily disappear with diathermia treatment (Dickson, Mumford), and the joint becomes painless and the normal range of movement is restored. Of the 200 patients, 188, or 94 per cent, recovered completely with loss of pain and return of normal function. Most of the patients required from one to six months' treatment for complete recovery. A few had symptoms from one to two years, but ultimately obtained satisfactory results.

While in more than 50 per cent of the cases, symptoms were present from six months to two years, over 85 per cent of the patients recovered normal, painless function within a period of six months after the institution of treatment. An interesting feature is that no matter whether the chief etiologic factor was considered to be trauma, infection or true metabolic irregularities, or whether the joints were manipulated under anaesthesia or whether the calcified bodies were removed, the recovery period was approximately the same in all groups.

Many writers have given the impression that they considered those cases in which a calcified deposit was demonstrated radiologically quite different from those similar in every other respect, except that the roentgenogram revealed no shadow. I feel that the basic pathologic state is the same in all these cases and that the principles underlying treatment should be identical. Calcification tends to disappear with the subsidence of symptoms and it may be that it is just an indication of the stage of attempted repair. A review of some of the reports would lead one to believe that the finding of a calcified area radiologically should be an invitation for its surgical removal. I certainly can not subscribe to this conception. In making this statement I realize that only five of the seventy-five patients who gave evidence of having calcium deposits in the shoulder were operated on. But, in comparing these five cases with those in which manipulation only was done, it would not appear that their convalescence was made materially less irksome or that the time of their disability was lessened. In all cases in which operation was done, it was also necessary to break down adhesions in order to obtain full abduction and rotation of the arm and it seems that this was more important to the patient than the removal of the calcium.

Of the 200 cases in this series, twelve patients failed to make a satisfactory recovery. In one, the patient refused to have foci removed and in another there was a very marked hypothyroidism which would not respond to general treatment. The remaining ten patients had adequate general and local treatment, and although they showed considerable improvement, slight discomfort continued.

An extremely interesting fact has been brought out in the follow-up study of this series of cases. Of the 200 cases, ninety-three were seen prior to 1928 and although the affected shoulder has remained well in all these, with one exception (in which there was a slight temporary recurrence) thirteen patients later developed joint symptoms elsewhere. Of these thirteen, ten gave a history of some gastro-intestinal disturbance at the time they were under treatmnet for the shoulder condition. Five had infected teeth and tonsils removed at that time, but in spite of the eradication of foci have subsequently developed other joint complications. This emphasizes the fact that there may be some general metabolic factor in these cases. Of the 107 patients seen since 1928, none has shown this tendency to date.

The study of the cases reported in the literature and of this series of 200 cases has shown most strikingly that an exact evaluation of the importance of any one of the factors which may be involved in the causation of the disease, or of the relative value of the various therapeutic measures, is practically impossible. But the study shows that in all cases, general rather than local treatment is of paramount importance.

TABLE 1—ANALYSIS OF 200 CASES

Total number	200
Number showing calcium by x-ray	73
Number of males	96
Number of females	104

Age Incidence

11-20	2	41-50	61
21-30	10	51-60	67
31-40	25	61-70	32
Over 70	3		

Number in right shoulder	103
Number in left shoulder	84
Number in both shoulders	13
Calcium deposits, right	45
Calcium deposits, left	23
Calcium deposits, both	5

TABLE 2—ANALYSIS OF 200 CASES OF PERIARTHRITIS OF THE SHOULDER

Number of cases reported				200
Number showing calcium—36.5%				73
		Without calcium	With calcium	Total
Injury 67	Injury only	11	6 34.7%	17
	Injury and infection	36	14 28%	50
Infection 176	Infection only	59	37 38.5%	96
	Infection and Metabolic	17	13 43.7%	30
Metabolic Problems 32	Metabolic only	1	1	2
No Demonstrable Cause 5		2	3	5

ANALYSIS OF METABOLIC DISTURBANCES

	Without Calcium	With Calcium	Total
Hyperthyroidism	10	8	18
Hypothyroidism	4	3	7
Diabetes	4	3	7

Postural Defects in Children

By Herbert E. Coe, M.D.

The importance of faulty posture as a factor in many of the indefinite complaints of childhood has been receiving an increasing amount of attention in the medical literature of recent years, but it is still too little understood by many physicians, nurses, teachers and others who come in contact with children. Physiotherapists in general and those in particular who are especially interested in muscle training, appreciate the importance of recognition of such postural defects and see the excellent results which follow proper treatment, but unfortunately they seldom can place their first hand knowledge where it will do most good, that is, at the disposal of pediatrists, nurses, teachers and parents. It is only by constant study of the various phases of the subject and by articles, talks, demonstrations of results, and careful use of tactful suggestions that we may hope to direct general attention to the early correction of these defects, which if permitted to persist produce many distressing and even disabling conditions of later years.

Failure to recognize or properly to evaluate faulty posture has at times resulted in subjecting children unnecessarily to an appendectomy or tonsilectomy for a supposed chronic infection, or to a prolonged course of "tonic" medication, or to a regimen of roughage, cathartics and internal bathing, or they have become unnecessarily difficult problems in home training, or subjects of psychologic study.

Failure to remedy postural defects during childhood has favored the development of many of the chronic ailments of adult life, prominent among which are low backache, lumbago, sciatica, chronic constipation, chronic indigestion and many of the conditions which are covered by the popular general term rheumatism.

I do not wish to be classed among those who see all human ills through the eye of a single specialty, or who hope to discover or develop a panacea. So I wish to state at the onset that I do not consider these various conditions to be due solely or even in large part to faulty posture in childhood. When, however, a careful history and examination show no evidence of an organic lesion of etiologic significance, it is most gratifying and often surprising to note the high percentage of excellent results which follows adequate correction of postural defects.

Many children are brought to the doctor because of one or more of the following complaints: growing pains, nervousness, irritability, poor gain in weight, will not sit up straight, always standing on one leg, can't be quiet for five minutes, always tired, sleeps poorly, constipation, vague pains in back, legs or abdomen, biliousness, and so on.

A patiently elicited history will in most instances reveal a definite cause, and if the history shows nothing of significance the cause will often become evident upon physical examination.

There still remains however, an appreciable number of children in whom neither history nor the usual physical examination gives a satisfactory explanation of the symptoms, and these are the children who are so often given tonics, food regulation, tonsilectomies, light treatments, suggestions to take more exercise, to be out of doors more, etc., all too frequently to no avail.

I have said "the usual physical examination," meaning an examination in a position of relaxation, flat upon an examining table, because that is the common practice and it explains a great proportion of this residue of undiagnosed cases.

The careful physician dissatisfied with his failure to find adequate cause for the symptoms, who supplements his examination at this point by a study of the way in which the child stands, walks, moves and reacts to muscle strain, will be rewarded in a high percentage of cases by the discovery of very definite postural defects. The most common ones are: flexible scoliosis, increased cervical and lumbar lordosis, round shoulders, protuberant abdomen, tilted pelvis, hyperextension of the knees, and flat feet. Frequently the apparent extent of the defects may seem too slight to explain the symptoms but upon careful analysis we often find a rather complicated chain of results, and may be able to trace the development of a condition which perhaps has puzzled physicians and been a source of real anxiety to parents.

The causes of faulty posture fall naturally into two groups. The first group may be termed extrinsic causes and they are so obvious as to require only passing mention. Familiar examples are: incorrect clothing, sitting upon one foot, carrying books or other objects always upon one arm, rotation of the body at the school desk, defective vision or hearing causing the head to be turned constantly to one side, torticollis, chronic cervical adenitis, neglected empyema, etc. These conditions frequently cause scoliosis and if allowed to continue will, of course, produce structural changes which are most difficult to correct, but if they are removed early the scoliosis either disappears or is easily treated. The more rigid types of scoliosis have become the subject of a rather voluminous literature and they will not be discussed.

The second group of causes may be termed intrinsic. They are less obvious, less understood, and have not been as generally discussed as they deserve. The postural defects arising from these causes are all due fundamentally to the fact that the upright position whether sitting or standing, is not a position of rest and its maintenance requires excellent strength and coordination of muscles with no laxity of ligaments. If muscles are weak from improper diet, lack of suitable exercise, under-development, or sickness, or are fatigued by undue demands or by chronic toxemia, they fail to coordinate properly and the burden of maintaining the upright position is gradually shifted to the ligaments. These in turn, when subjected to continued strain, lengthen, permitting abnormal joint conditions which bring additional stresses and strains upon other ligaments and muscles, or which cause nerve pressure resulting in reflex tension upon still other muscles.

The vicious circle is evident: muscle weakness or fatigue produces ligamentous strain and lengthening which causes abnormal positions which result in muscular tension and fatigue. The weaker the muscles and ligaments the worse the posture; the worse the posture the more continuous the strain upon the muscles and ligaments.

The muscle fatigue and the change in posture in some cases progresses so slowly that they are overlooked. They may not produce early disability or symptoms, because faulty posture often undergoes compensation. That is,

muscular power becomes great enough, especially during the years of growth, to permit normal activities in spite of the postural defect, and this strength continues through youth and early adult life. During later life as muscle power wanes, secondary symptoms begin to appear. Strained ligaments and muscles may become the points of election, where toxins from infected teeth or a sluggish colon manifest themselves long after childhood. The chronic ailments of adult life previously mentioned all may have a distinct basis of faulty posture. The individual who is nervous and irritable, the chronic grouch or the nagging woman, may only be exhibiting the unconscious reaction to a constant, unrecognized strain, which develops insidiously as increasing weight and diminishing muscle tone cause decompensation of an early postural defect. Correction of such defects late in life is always difficult and frequently impossible on account of structural changes but during childhood it is usually simple.

Let us now analyze those defects which result from the intrinsic causes. These children practically always have general muscular weakness or hypotonia which is fundamentally responsible for their difficulty in easily maintaining the upright position and which results in an exaggeration of the normal spinal curves, protuberance of the abdomen, tilted pelvis, hyperextended knees and flat feet.

The increased cervical lordosis makes the child raise his chin and tilt his face upward, and it is hard for his jaw muscles to keep his mouth closed. Also, it relaxes the cervical fascia which with its expansion through the right side of the pericardium, acts as the chief ligament for the support of the diaphragm. This relaxation lengthens and narrows the chest cavity, narrows the intercostal spaces and the costal angle, increases the dorsal curvature of the spine and the tension on the muscles of the upper back. The lowering of the diaphragm throws more of the weight of the abdominal viscera upon the mesenteries and ligaments, resulting in altered blood supply, impaired function and abnormal nerve stimuli. The viscera sag against the already hypotonic abdominal wall increasing the lumbar lordosis and the protuberance of the abdomen. The relaxed abdominals and the increased lordosis permit the pelvis to tilt forward stretching the hamstrings and altering the bony relations at the points of emergence of the components of the sciatic nerve. The stretched hamstrings and hypotonic quadriceps permit varying degrees of genu recurvatum with stretching of the knee ligaments and increased tension upon the calf groups. This in turn tightens the tendo Achilles and favors pronation of the foot with resultant foot strain.

It is easy to trace the chain of symptoms which result from these abnormal physical relations.

The up-tilted face with the resultant difficulty in keeping the mouth closed favors infections of the upper respiratory tract and chronic catharrhal conditions. It also tends to slight eye strain by disturbing direct vision and may, by altering the relations in the neck and at the base of the skull, interfere with the return flow of blood from the intracranial vessels, both of which conditions increase the tendency to headaches. The relaxation of the deep cervical fascia and the suspensory ligament of the diaphragm, with resultant changes in thoracic shape and activity interfere with proper oxygenation of the blood, diminish general and local resistance, and predispose to lung infections.

The change in the blood and nerve supply to the abdominal viscera due to the lowered diaphragm results in constipation, and the strain upon the mesenteries produces abdominal pain. The pressure upon nerve roots due to the increased lordosis and pelvic tilt, causes pains in the back and legs, which together with those caused by knee, calf and foot strain constitute a great proportion of the so-called "growing pains." It must be remembered that growth does not cause pain.

The constant muscle strain results in increased muscle catabolism and the child is always tired. He can not relax easily at night, delaying sleep and making the period of effective rest so short that there is not sufficient time for muscle regeneration and elimination of fatigue products, and he awakens tired and irritable in the morning. He constantly shifts his position to relieve the abnormal stresses and tensions. When admonished to "sit still" he cannot do so and is charged with complaining, irritability and nervousness. Next he develops defense reactions and becomes the psychologic point of irritation in the family.

It is easy to see how, in this melancholy picture, one thing leads to another and the child may finally come to the doctor because of a complaint which apparently is in no way connected with faulty posture. The term "faulty posture" is inadequate and we should follow the recommendation of one of the committees of the White House Conference that references to "faulty posture" and "postural defects" be discarded in favor of the more inclusive terminology relating to body mechanics.

The treatment of these conditions should be under the direct supervision of a physiotherapist skilled in muscle re-education and training. The advice and admonition to take more exercise or be more out of doors, often defeats its own purpose, for a child follows the line of least resistance. He is concerned only with the results of muscle action and he makes his motions in the easiest way. He uses the strong muscle groups and neglects the ones which require more effort, with the result that the strong groups get stronger and the weak ones weaker.

Improvement and correction of the underlying causes can only be effected by careful development of the weaker muscle groups and the restoration of a correct muscle balance.

830 Medical & Dental Building, Seattle, Washington.

The Ambulatory Treatment of Fractures Below the Knee*

By Herbert E. Hipps, A.B., M.D., Marlin, Texas

The ambulatory method simply means that the patient is allowed up and walks on the broken leg within a short time after the fracture is set. He does not use crutches, cane or any other method of support. This closely approaches the ideal in fracture surgery, but the method I shall describe here is limited necessarily to fractures well below the knee. This rather marked improvement in the method of handling these fractures has been brought about by the use of the "walking iron" technique and local anesthesia. Therefore, a brief discussion of

*Reprinted by permission from the Texas State Journal of Medicine. Read before the Section on Surgery, State Medical Association of Texas, Waco, Texas, May 7, 1932. From the Department of Orthopedic Surgery, Torbett Sanatorium, Marlin, Texas.

local anesthesia is in order, since I have used it in nearly every case treated by the ambulatory method, and by so doing some patients have been up and walking around before they would otherwise have recovered from the effects of a general anesthetic. Hence I must consider it an almost essential phase of the ambulatory treatment.

The use of local anesthesia in the treatment of fractures is a relatively new practice in America. It had been used to some extent before Böhler, of Austria, first began using it extensively during and after the war, but to him we must give credit for popularizing it and showing definitely its effectiveness and distinct advantages.

The technique is simple. The skin is cleansed over the fractured area, all hair shaved and the skin painted with iodine. Two per cent novocaine solution is then injected into the fracture site.

The advantages are obvious. As perfect an anesthesia and relaxation is obtained as under deep ether narcosis, without the discomfort of going to sleep, the incidental pulmonary hazards and the necessity of staying in the hospital all night, at least, to recover from the effects of the anesthetic.

The danger is infection introduced from the outside by the needle. This possibility certainly merits consideration and is worthy of our gravest concern; however, experience has shown that if the skin is properly prepared beforehand the danger assumes infinitesimally small proportions.

To permit a patient to be up and around on a broken leg while it is healing is not a new idea. It was practiced as early as 1891, when Krause, a German surgeon, first published his results in this type of case. Korsch, in 1894, presented a paper to the German Surgical Congress, demonstrating that fractures could be put up in plaster and early use permitted. Dollinger of Budapest, in 1893, described a plaster splint for the ambulatory treatment of fractures of both bones of the leg and reported three cases. Worbasse, at the Methodist Episcopal Hospital of Brooklyn, New York, in 1893 was the first in this country to use this method and reported six cases so treated. N. D. Dandridge of Cincinnati, reported eight cases, and recently Böhler of Austria, has used the method rather extensively in fractures about the ankle. The latest article I could find on this subject was by Perkins and Mulhern of Worcester, Massachusetts, who reported five cases of fracture of the lower one-third of the tibia and fibula and about the ankle and foot, treated by this method.

Krause, Worbasse and the others simply applied the plaster closely about the reduced fracture and permitted the patient to walk on the cast, a practice which we now know is not altogether reliable, since the fragments will often slip in a cast under these conditions. Dollinger applied the cast, but placed cotton under the sole of the foot, so that the leg would slip downward as weight was borne and the calf of the leg would thus become wedged between the converging diameters of the inner surface of the cast, and yet no weight would be borne on the lower part of the leg. Perkins and Mulherne use the plaster cast, but do not pad the bottom of the foot. The elasticity and softness of the calf tissues permit some degree of descent of the leg on weight-bearing, so that there is a slight amount of weight that is transmitted upward, even with the walking-iron.

The technique of application of the cast and walking-iron that I use, obviates, I believe, the difficulties and hazards of the other methods, and is as follows:

After the fracture is satisfactorily set, a stockinet is drawn on over the leg and one thickness of sheet-wadding only is placed over the stockinet. On the bottom of the foot about 10 or 12 thicknesses of sheet-wadding and about one-half inch layer of cotton are placed. The usual felts over the heel and malleolae are placed and plaster of Paris applied, moulding it closely about the calf of the leg. After it is hardened the patient is permitted to return home, instructed to keep the foot elevated and to return on the third day for application of the walking-iron, which is quickly done with two rolls of plaster. Now, when the weight is borne the foot descends somewhat against the soft cotton and sheet-wadding base placed there, but does not make contact with the hard plaster sole. The weight is borne by the diverging surfaces of the calf of the leg and the head of the fibula against the closely moulded plaster cast, thus protecting the fractured area below, yet giving functional value to the leg, in that it still remains a weight-bearing member.

The advantages of this method, as I have found from studying my series of cases very carefully, are as follows: (1) the patient's time is saved; (2) his general health is preserved; (3) he is more comfortable; (4) the procedure is less dangerous in specific cases; (5) primary swelling is lessened; (6) secondary edema and muscular weakness are less; (7) there is less atrophy of the muscles; (8) less after-stiffness of joints, and (9) union occurs more rapidly.

Some of my patients walked on the second day after the fracture was set, others as late as ten days, and most of them after about four or five days. This is obviously a tremendous saving of time to the patient. A business man may go back to work at an early date and carry on his usual duties. Laborers can sometimes go back to work where their work does not entail too much walking. The method likewise saves the patient a hospital bill, which is often greater than the surgeon's fee itself, and in private hospitals to which charity cases come, it represents a considerable saving to the hospital.

The patient's health remains good throughout; he walks about as usual, eats and sleeps normally, whereas by older methods, he lay in bed for from four to six weeks, became nervous, depressed, irritable, worried and constipated. His appetite became variable, he lost sleep and usually had lost considerable weight by the time the fracture was healed. When the patient is up and around, he is infinitely more comfortable than lying in bed, with adhesive stuck to the leg and a weight pulling over the end of the bed. The method is of prophylactic value in those addicted to alcohol, in that there is less likelihood of delirium tremens, and in old persons hypostatic pneumonia as a dreaded complication to prolonged recumbency is practically banished.

The primary swelling about the fracture site is lessened, because the functional use of the extremity increases the return flow of blood and more rapidly drains off the extravasated blood and edema.

Secondary edema and muscular weakness do not appear after the removal of the cast, since the patient has been using the extremity all the time. I have seen patients who have had a swollen foot and leg for one year or more after a fracture is healed, due to poor circulation in the extremity. This does not occur in "walking fracture cases," thus lessening the final period of disability.

There is a great deal less atrophy of the muscles. In one of my cases there was only one-eighth inch atrophy of the calf muscles after six weeks in the cast. Another showed only two-eighths inch trophy, and in others there was practically none.

Joint stiffness is reduced to a minimum. All of these patients, when the cast is removed, have practically an 85 per cent free range of motion in all directions of the joints that were enclosed.

Union occurs more rapidly in these cases. In two of

my patients union had occurred well enough in three weeks that I removed the cast and allowed them to begin walking. These, however, were cases of minor types of fractures, a chip fracture of the medial malleolus in one instance and a fracture of the metatarsal in the other. Union in all is solid and firm at the end of from four to six weeks, whereas by older methods the retention splints were removed at this time and the callus still found to be so soft that weight-bearing could not be permitted. Probably the fact that the general health of the patient is better contributes to this more rapid healing; it is also possible that the normal functional use of the injured member itself contributes to this more rapid healing process. Certainly it is true that the circulation in the extremity is better and remains better during ambulation and I am sure this is an important contributory factor.

The dangers of the method are, first, ignorance of its limitations and, second, fat and blood embolism. The latter is probably a true danger but is a negligible factor and certainly a chance worth taking, considering the markedly bettered status of the fracture patient treated by this method.

The limitations of the method, which I have learned from experience and by consulting the literature, are as follows: (1) badly comminuted fracture of the long bones in any location; (2) long oblique fractures, and (3) fractures of both tibia and fibula at and about the middle of the leg, although in those about the middle, ambulation can usually be permitted at the end of three weeks. In most fractures of the last type the fragments will become displaced by muscular pull if ambulation is permitted too early; hence it should be permitted only very cautiously and the patient should be kept under constant observation until union is relatively firm.

I will cite briefly essential details of six of the thirteen cases that I have treated, selected to show the variety of positions and types of fracture to which this procedure is applicable, and which brings out some of the advantages outlined here.

Case 1. Fracture of the metatarsal, no displacement. The plaster of Paris cast was immediately applied, following which the walking-iron was attached to the cast with two rolls of plaster. After one hour, which time interval was allowed for the plaster to dry, the patient was able to walk comfortably.

Case 2. A compound medial subastragaloid dislocation of the foot, fracture of the internal malleolus, crush fracture of the astragulus and fracture of the os calcis. Treatment in this case consisted of tenotomy of the tendoachillis and reduction of the fracture under spinal anesthesia. After the patient was in bed ten days, a cast and walking-iron were applied and the patient immediately began walking about.

Case 3. Potts fracture. Reduction was done under local anesthesia. The cast was applied immediately after the injury, and the patient permitted to go home. The walking-iron was applied on the third day, following which the patient was able to immediately return to work.

Case 4. Comminuted fracture of the middle third of the tibia and fibula. The fracture was reduced under local anesthesia and a long cast applied. The walking-iron was applied on the fourteenth day, and the cast cut to below the knee, following which the patient was able to resume her duties as a cook.

Case 5. Double oblique fracture of the lower one-third of the tibia. The fracture was reduced under local anesthesia and the cast applied. The walking-iron was applied on the sixth day, following which walking was permitted.

Case 6. Oblique fracture of the fibula. In this case, the walking-iron was applied on the second day and the patient was immediately permitted to walk and went back to work.

In all of the cases cited, the final results have been entirely satisfactory, and I feel that the method of treatment described is a distinct step forward in the treatment of fractures below the knee.

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ABSTRACT OF DISCUSSION

Dr. J. H. Dorman, Dallas: I have used local anesthesia in the reduction of fractures to a limited extent. On the Parkland service at Dallas, where most of the fractures in Dallas are treated, due to the service being a charity one, we use all types of anesthesia in treating fractures, except amytal. Usually local injections of novocain in 1 per cent solution, is reserved for fractures of the arms and forearms; however, I prefer general anesthesia, due to the better relaxation and removal of the psychic factor, as most patients coming in with a fracture with deformity are in dire dread of being hurt and muscle spasm occurs even when the patient is not experiencing pain.

We sometimes resort to local anesthesia because the house surgeon is permitted to reduce the fracture without general anesthesia. A member of the staff must be present if general anesthesia is used. There is also another time-saving element, and saving for the hospital, in that the patient is not hospitalized. We have used the method and have come to the conclusion, in checking our fractures before and after reduction by the local and general methods, that unquestionably we get better reduction by use of general anesthesia. However, we believe this method has a permanent place in the early reduction of fractures when cases are selected, such as those in which one hesitates to give a general anesthetic.

I think Dr. Hipps' paper is timely. We are slow here in accepting the lessons taught in the great school of experience—the late war, with reference to the addition of the third element in the treatment of fractures. Our old authorities taught us to first reappose the fragments, and second to immobilize the member; the late war added the third one—restoration of function—due to the loss of same from the improper use of the second factor in treatment. Now comes the industrial surgeon adding another and more important step as a substitute for the last factor, namely, preservation of function.

In discussing the ambulatory treatment, the one thing which was emphasized by the war, where Dr. Böhler got his inspiration, was the long disability resulting from too long immobilization and the loss of function by such the restoration of function, which was all the orthopedist treatment. It was imperative that the profession devise procedures for the preservation of function rather than could attempt to do in those days. I am reminded of the

doctor who could cure fits; if he could throw the patient into a fit he could cure him. So with the orthopedist, if he could have the patient lose a lot of function he could restore him to health.

Today, and in the future, our efforts in the handling of fractures must be directed to the preservation of function rather than the restoration of function, so we must receive with appreciative recognition and due consideration any contribution from the younger members of our profession in such efforts and we want to encourage and stimulate them to further efforts in the use of *early active motion* in the treatment of fractures, thereby preserving the function, motion, mobility in joints, normal blood supply, muscle tone, preventing muscular atrophy, tempered by a keen observation of each case, varying their treatment by the requirements of each case, remembering every fracture is a problem of individual characteristics, requiring frequent and personal observation.

Dr. Penn Riddle, Dallas: I had the opportunity of visiting Dr. Böhler's clinic in Vienna in 1929, and saw his results in treating fractures below the knee with the ambulatory method. I noted that he permitted the patient who had a fracture of the tibia alone, without displacement, and without much swelling, to walk immediately after the cast had dried well. He applied a walking-iron to the heel of the cast. I noted that he applied plaster of Paris directly against the skin without padding, which caused some irritation of the skin at times. Dr. Böhler claims that applying the paster of Paris directly against the skin helps hold the bone in better position.

Dr. Hipps (closing): The early initiation of conservative physiotherapy and active movement in any fracture is indeed a most desirable and most essential part of fracture treatment. Patients with fractures treated by the ambulatory method, however, do not need massage, baking or diathermy, for they are using their leg muscles all the time and hence atrophy, weakness, joint stiffness, *et cetera,* do not develop.

One objection frequently given to this procedure is that the limited amount of movement that necessarily occurs between the fragments on ambulation will hinder healing. This has not been so in my cases, but the converse seems to be true. During the war it was noted that one particular French surgeon always obtained unusually large calluses in the fractures treated by him, as they were healing. On inquiry as to how this came about he showed that every day he would move the fragments slightly by twisting or jerking the leg in some way. Nature, following Wolf's law, then throws out a large amount of new bone to compensate for the irritation and tearing down done by the daily leg movements.

Another instance I may cite is a recent paper by a pathologist in England. Out of several thousand autopsies he had done, he found a total of 857 rib fractures and not a single one had failed to heal. Of course, it is impossible to totally immobilize a fractured rib, yet it will be noted that in the large group of 857, a healed fracture was found in 100 per cent.

Thus, I think that any objection based on the surmise that healing is delayed or prevented is not based on known facts. Of course, there are limitations to the amount of motion that can be allowed between the fragments, but in my cases, with the fracture well set, cast carefully applied, and weight-bearing not allowed on the break itself, there is not and cannot be too much movement between the fragments. Taken all in all, for the limited group of fractures to which this method is applicable, it is the most satisfactory method of treatment I have ever used or seen used.

The "Walk-Aider"

The Story of What the Determination and Inventive Genius of One Invalid Have Produced for the Benefit of His Fellowmen

By Margaret W. Cleaveland

Over two years ago, Mr. Walter C. Greene, an engineer of Cleveland, Ohio, was stricken with a disease of the spinal cord, resulting in paralysis of the lower extremities. Always an exceedingly active man he could not bear to be so helpless, and his inventive mind began to work on the idea of developing something which would help him walk, and give him the confidence which he found crutches could not give him. After much experimenting he has developed a remarkable convalescent chair which provides a means of exercising and also of relaxing. He has named it the "Walk-Aider." It was recently demonstrated before the Neurological Society in Cleveland and is creating great interest among the medical profession.

The Walk-Aider is essentially a combination exercising and adjustable relaxing chair—comprising an adjustable seat with leg support, and adjustable back and foot rests. Connected with and extending forward on either side of the seat in definitely spaced relation with the seat and back rest, is a pair of parallel bars. The chair leg supports and bars are equipped with casters so located that the chair and parallel bar structure are in closely balanced relationship. In other words it is impossible for the chair to tip over or skid no matter what the occupant does. Normally the chair rests on the casters, the forward legs of the bars being raised from the floor, in which position the entire combination may be readily wheeled with its occupant wherever desired.

Pressure or weight placed on the parallel bars will cause the lower ends of the front legs to contact the floor and lock. This position raises the rear casters of the chair, permitting the user of the Walk-Aider to stand between the bars with a firm and steady support. Thus he is given confidence and material aid in walking.

The lower ends of the forward legs of the bars are equipped with rubber tips instead of casters to give stability when they contact the floor.

There are various accessories and attachments for exercising purposes. A tension spring can be furnished to fasten across the lower bars to give leg exercise, or it may be attached to the upper or middle bar for arm exercise such as is obtained by wall weights. The foot rests may be folded up and drawn back out of the way and a board placed across the lower frame at step height for practice in stair climbing. A table board can be rested on the curved ends of the top bar structure and the back tilted to comfortable reading position. For eating or typewriting the board is placed on the second bar. When not in use this table board hangs at one side.

Any invalid who has the use of his arms can make any of the adjustments himself. The chair back is easily let down to full reclining position, and as easily brought back. The occupant can exercise, recline, read, write, eat, transfer himself to and from the chair, pass through doorways, in fact can practically live in it.

Because of the ease of transfer to and from the Walk-Aider, the patient is independent of assistance in the use of the toilet or the lavatory. The arms can be folded up, permitting close contact with the lavatory for shaving.

Another feature is particularly interesting to the physiotherapist. We all know the tendency of the paralytic to throw his legs outward in walking. Ordinary parallel bars do not prevent that; but the Walk-Aider does. Because of the lower bar and foot rest, the patient is very careful after one experience not to hit his ankles against them, and learns to walk naturally.

This chair is constructed of aero-plane steel tubing, all joints welded, giving rigidity with light weight. It is upholstered in leather with pneumatic air cushions that contain springs. The arm rests are padded with soft resilient material, thereby preventing any pressure from hard surfaces on the nerves of the arms. They are adjustable so that they are always in proper position in relation to the angle of the chair back.

The development in muscle power which the inventor has gained is remarkable, and his great interest is to help others to do what he has done. He sent a chair to a policeman, paralyzed for many months, who could not sit on the edge of his bed without help. In eight weeks he was able to take a few steps and is improving. One was sent to a hospital for the use of an elderly lady with a fractured hip. She regained her strength and ability to walk easily without the aid of crutches.

A smaller chair for children is being made, and Mr. Greene's hope is to manufacture these chairs so that the price will be no greater than that of a good wheel-chair. Plans are being made to add side wheels, so the chair may be propelled by the occupant while sitting—also, higher bars may be arranged to act like crutches for those who must have support under the arms. In short Mr. Greene is making as nearly perfect a convalescent chair as it is possible to do.

Observations on Scoliosis

By Beatrice Woodcock

We are all familiar with Scoliosis, from the mild postural type with its beginning rotation, to the more severe type with its corresponding distortion and deformity.

As we observe and treat these cases do we consider them merely as a static structural deformity, that if needs be, must be forced into correction, or do we see a dis-aligned body and spine with accompanying disturbance of equilibrium, weight bearing, and the steady pull of gravital forces?

Dr. Steindler once defined posture as "The expression of equilibrium and balance of the body. In contrast locomotion expresses a rhythmic play between loss of balance and its recovery. In posture the individual is at rest and its balance for the moment secured; in locomotion the balance is overthrown by the moving body, which however, is constantly engaged in efforts to re-instate it."

In observing a Scoliotic spine in locomotion we will find that the efforts at re-instatement are not successful, and according to the degree of the curve so we will find a preponderance of weight on the side of the convexity. Control of normal body balance is lost and we see that Scoliosis is essentially a question of Balance.

It has been said by Doctors at different times that they have never seen a Scoliotic spine corrected. Some say they have seen them made worse, whether by treatment or because they were progressive cases we do not know.

If we recognise in the first place that correction of a structural curve is an anatomical impossibility it will do much to help in our method of treatment.

Therefore we do not set out to correct, but to re-align body and spine so that weight bearing is evenly distributed and equilibrium maintained.

In the gymnasium all our efforts must tend to this end; to bring the shoulders back to their normal relationship to the pelvis and ankles, or in other words, to bring back the centre of gravity over the centre of support. How, then, can this be done?

Only by developing compensatory curves above and below. Although we know that we cannot correct a structural curve, we also know that we can shorten it, by bringing the ends into compensatory curves. At the same time we maintain the rigidity of the centre of the curve, the stabilizing factor of the spine. The end result is a shorter curve, less rotation and deformity, and re-gained balance. In mild cases, where there is no rotation correction results.

This method of treatment differs only a little from the corrective method as far as gymnastic work is concerned. The basic principles are:

1. Maintain the primary curve.
2. Develop counter curves above and below.
3. Teach shifting of body weight from the side of the convexity to the side of the concavity.

Shifting is the key to re-alignment and is only possible when the lumbar spine is well mobilized. In some cases this takes months of hard work to obtain, particularly in cases that have had chiropractor treatments, and unless it is developed no re-alignment can take place.

Mobilizing exercises take the first place in importance in compensatory treatment.

We must bear in mind that while we are working for a mobile lumbar spine, we must not loosen the primary curve itself. We must discriminate in our mobilizing exercises.

Eliminate all hanging on bars, ladder travel, and suspension exercises. In their place substitute Klapp creeping exercises. While working to loosen the lumbar spine we can also give general body building and compensatory exercises.

Our aim should be to develop the muscles of the trunk to take the place of the brace.

In the last phase of the treatment emphasis should be placed on balance. By means of the balance beam many excellent exercises can be taught. Some of these can be done in pairs and the competition is usually very keen.

Finally every child with Scoliosis should be taught to swim, breast stroke for all and right or left overarm according to the curve.

Children's Orthopedic Hospital, Seattle, Wash.

Occupational Therapy at the Texas Scottish Rite Hospital for Crippled Children, Dallas

By Isabel M. Cameron

In this hospital physiotherapy had been established some time before occupational therapy. It was, in fact, the first organized department in this type of hospital in the state. Occupational therapy was considered for many months before it finally made its appearance just a little over a year ago. The writer can not help but feel this was the natural sequence of events and a wise move in organization.

The occupational therapy department is maintained and supported by the Dallas Junior League. The first few months the work was carried on only in the wards. This was done for two reasons, first in order that everyone could become acquainted with the work and secondly, so that we could "get our bearings." In January the hospital gave us a room which is centrally located and very airy and bright, as it had been formerly used for the children's sitting room. It was decided that although it deprived a certain number of children of a pleasant recreation room, yet more of the patients could come every day if the room was made into a workshop. It is interesting to note that the children persist in calling this the "Playroom" and have been reluctant to change it, although at first we tried calling it "Workshop." This name they gave distinctly meant something in their minds, so it has remained "The Playroom."

When we reconstructed the room, we tried to make everything in it appeal to a child. The cupboards are little white cottages with natural colored shingles and cunning green shutters. We have a lovely wrought iron tree blooming with plants and our floor covering is linoleum which represents fancy tiling. Our equipment consists of two floor looms, overhead loom, jig-saw, and work-bench with tools. Also, light equipment used for bed patients, such as lap-looms and frames for knotting.

Each day the children come to the room, the boys in the morning and the girls in the afternoon. The special muscle training cases are taken care of by the trained worker. The other children are helped by the volunteers who are Junior League girls.

Every fall a class in hand crafts is given for the volunteer so that she will really be of help in the room. Also, there is a distinct advantage in her favor, for the more she knows of the work which is being carried on the more interest she is able to show.

To digress slightly, the writer would like to express herself about volunteers. There is a great advantage in having them assist a trained worker. There are a great many tasks to be done which they enjoy and yet save the director. It stimulates the interest of a community in a new project. They are able to bring new enthusiasm to the patient who sometimes tires of seeing the same people every day. Many of the volunteers have leisure time to work up new projects or suggestions which is quite beyond the reach of the busy worker who has only hours after work to look for such things. It is not advocated to use volunteer workers to the exclusion of trained people, for this would be defeating a strong purpose, but there is always enough to be done so that a limited number of volunteers can find great interest in the so-called newer professions.

On one afternoon a week children, whose stay is for a length of time, are brought to the Playroom for school. The local school board has allowed us books and the children are tutored in not more than two subjects at a time. It is difficult for them to study in the wards where there are so many distractions so if they can get two subjects well, it is satisfactory. Last year we had some very gratifying results.

When in the Playroom the children are expected to do as much for themselves as possible. The handicap is minimized unless they are sent specifically for muscle work. Each child turns out the best article he is able; he is allowed to criticise it and decide how he could do it better. We tell the children that the best is none too good. Handicapped children grow to apologize for their shortcomings because they have heard others excusing them. This they grow to hate within themselves and have a great regard for those who treat them as equals and overlook their deformities. So, we stress not only the muscle training side, but also the mental hygiene.

It is not easy to decide which is the most important side of occupational therapy, but surely the one which is the most interesting is its correlation with physiotherapy. It is most satisfying to see even the smallest result with a case which requires close supervision and observation. We see the little patient come from physiotherapy to occupational therapy every day and show the child the value he is receiving from his formal and informal exercise. Most children quickly appreciate the growing ease with which they are able to accomplish some given thing. However, caution must be used not to stress his illness, but rather his achievement. Seeing these results is the end-all of our professional dream.

The Physiotherapist and Orthopaedic Nursing

By Winifred G. Moore, R. N.

An extremely important, yet often disregarded phase in the nursing care of the injured and cases of protracted illness is the maintenance of correct anatomical position of such parts as may easily become deformed. It seems that the statement known as Wolff's Law—"Every change in the formation and function of bones, or of their function alone, is followed by certain definite changes in their internal architecture and equally definite secondary alterations of their external conformation in accordance with mathematical laws"—would apply to the change of function in the case of long disused bones.

There are several factors that tend to control the formation or prevention of deformities. The weight of the bed covers is only partially responsible for the occurrence of a tight heel cord and drop foot after long recumbency. Gravity plays an important role and may produce changes, such as torsion of the long bones, which are very disabling to the individual. The elasticity of muscles has a direct effect on joints that remain for long periods in one position. A pillow placed at the feet, or a cradle to take the weight of the covers, does not eliminate gravity; neither does it prevent the contraction of stronger or resting muscles. Outward rotation of the thigh with consequential contracture of the flexors and outward rotators is a common result. It is one of the most obstinate deformities to correct and it is not prevented by merely removing pressure from the foot.

In a recent number of the Journal of the C. S. M. M. G., I read an article in which was quoted as being King Edward's phrase, "If preventable, why not prevented?" From the economic standpoint we might consider the importance of prevention, taking for example the charity hospital. First, the cost to the institution of prolonged and repeated hospitalization; second, the surgeon's time required for operations and manipulations that might have been avoided; third, the additional work thrown on the physiotherapy department; and by no means the least to be considered, the patient's time lost from school or other activity, besides the detriment to health that is incurred by surgery.

There are means for holding correct body alignments whether in the supine position or erect, and, important among these, is the use of foot splints, properly applied, in all cases of poliomyelitis or long recumbent cases that show tendency to tightening heel cord or eversion and rotation of the leg. The splint should be long enough to give support just above the knee, lifting sufficiently to hold it in very slight flexion, thus giving greater comfort while taking strain off the ham-strings. The calf should rest in a hammock-like sling of some slightly elastic material, such as stockinette, terminating with a more firm support just above the malleoli, leaving the back of the heel entirely free from any pressure. The foot piece, at right angles to the leg, and close enough to support the foot in neutral or upright position, is padded, and, if necessary to prevent eversion or inversion of the foot, has its edges extended and turned upward at the level of the metatarsals. It is important that the foot piece extend about an inch beyond the toes, as it then serves to keep the weight of the covers from the toes, and when the patient is in the prone position the weight of the leg cannot push the foot into plantar flexion. Straps of webbing or stockinette bandage may be used to hold the limb in position. From the foot piece is extended vertically sufficient support to hold the tibia and heel off the bed, and to this is added a horizontal bar long enough to stop rotation of the splint in either direction. Particularly for Poliomyelitis or other flaccid paralysis, there can be other additions made to the splint, as a felt pad supporting the arch if the feet are severely pronated; or in the case of overactive toe extensors a pad under the metatarsals with a strap or bandage tight enough to hold the toes to the plate.

There are other malpositions to guard against. Even in the supine position lateral curvature of the spine may commence, and whether caused by unbalanced muscle power or habitual position, its progression may be alleviated by such simple precautions as placing the bed so that toys, books, visitors, etc., are opposite to the side that shows tendency to shorten. Sand-bags or other supports also may be of service. This suggestion is a good one to give to mothers or those caring for children with torticollis. The crib, the highchair or the perambulator can be in such position that in order to reach toys or watch any one in the room the child must turn his head in the direction which will stretch the shorter sterno-cleido-mastoid muscle. It can not be expected that mothers who find themselves suddenly plunged into caring for such a child with Poliomyelitis or other slow convalescence can foresee the possible results of long incorrect position. The physiotherapist therefore finds that her responsibility does not end with carrying out the necessary treatment or exercises in instructing the mother in a daily thirty or forty minute controversy with the child. She needs to explain why the limbs are splinted and why the child is not to walk or sit up unsupported. And, chief of all, the mother must understand for what object the treatment, whether it be muscle re-education or stretching, is given. She should be instructed that for the sake of keeping the hip flexors stretched, in the inactive child who must sit a good deal, the patient should be turned on the face for a part of every day, care being taken that the feet are not dragging into plantar flexion and thighs do not remain in a rotation-abduction position. Special emphasis should be given to the necessity for immobilization of Tuberculous joints, should the patient be sent home during the recumbent stage. A word here about the care of hip spica casts—it may not be perfect, but it does help. If the patient is placed on a Bradford frame with the head a few inches higher than the feet, drainage from voiding is less apt to saturate the back of the cast. Besides this, the plaster will dry more quickly and much heavy lifting by the nurses is eliminated.

The atmosphere created by the physiotherapist in the department is often the one in which the work is carried on in the patient's home. Enthusiasm and interest are contagious, and, unfortunately so are pessimism and indifference. Whether the treatment be by electricity, hydrotherapy, massage or exercise a great deal of the final outcome depends upon the determination and zeal with which the patient operates. Going through the movements mechanically will not bring as much improvement as a few purposeful contractions. Electro-therapy requires a certain understanding and submission on the patient's part, and certainly no fear. A word of encouragement at the slightest improvement is a milestone in

the long road of muscle training or posture correction.

The supervision of brace repair and other apparatus falls to the physiotherapist in connection with the out-patient department. If a patient comes to the department two or three times a week, or perhaps less often, no one sees the brace but the physiotherapist. She observes it on the patient, making mental note of any deficiencies. If there is a brace shop in the hospital, any repairs can be made while the patient is having the treatment. Often the function of the brace is not all that could be desired and the physiotherapist who sees the patient often is the one who should make an early appointment for him to return to clinic or doctor's office, with a note stating the reason attached to the chart.

Thus, with the many opportunities that present themselves in our daily round of contacts with human beings not always so fortunate as ourselves, and by practicing prevention as well as cure, may we widen the scope of our service and gain the greater confidence of the medical profession and the people.

Texas Scottish Rite Hospital for Crippled Children, Dallas, Texas.

Fibrositis*

By Mrs. Justina Wilson, F.R.C.P., D.M.R.E.

The conditions dealt with in this paper are more or less chronic affections, from the simple attack of lumbago to many more complicated conditions often labelled "chronic rheumatic" but dependent on very numerous and different etiological factors.

In fibrositis the morbid process is not restricted to one particular tissue. It particularly affects muscular structures, especially their fascial coverings, their aponeuroses, insertions, intermuscular septae, the fibrous capsules of joints, the nerve sheaths, bursae, fibrous ligaments, and even the periosteum of bone. The essential change is said to be probably an inflammatory hyperplasia of the fibrous tissues; the affected areas are swollen, indurated, tender to pressure, while sudden movement of the affected muscles causes intense pain.

From the point of view of physiotherapy the changes in the muscular structures are most intense and important. These have been defined by Dr. A. Muller, who first described them. They are four in number:

(1) Hypertonicity.
(2) Induration in the muscle body and hardening of its fibrous sheath.
(3) The definite formation of the typical nodule, and
(4) Swelling.

Hypertonicity is found in any muscle that has become the seat of a chronic fibrotic process, because after contraction the affected muscle remains in a state of irritation, hypertension, even of spasm. This gradually becomes more or less chronic, and thus there is produced a gradual hardening over the irritated muscle, in its sheath, its fascial expansion, as well as in the deep and superficial aponeuroses. By degrees, knotty deposits are formed in these, and can be felt. They are definitely tender to pressure. Later on, on deeper palpation, areas of local tenderness can be felt in the substance of the muscles.

The morbid process may extend to *the sheath* of the nerves of the area, and there is much pain, simulating in the arm painful brachial perineuritis, and in the leg sciatica, as the most painful points usually coincide with the point of emergence of the nerve trunks.

The specific fibrous nodule of fibrositis can only be found on very deep palpation which is an art in itself. The favourite site for nodules is about the insertion of the muscles. Such a nodule may be the size of a pin point, of a lentil, or it may be much larger than a large pea. Some are round, some are spindle-shaped. To the experienced palpating finger they offer a distinct and specific hardness. This nodule becomes the centre for hypertonicity and irritation, and it is often very difficult to find because of the extreme hypertonicity of the muscle, and because the method of palpation is often wrong. Gentle palpation on the one hand is often too slight, and a sudden digging in of tactless fingers will give rise to more spasms and more tension. The right palpation is a skilled and gradual pressure which works by degrees into the depths of the tissues, and causes them ultimately to relax.

The swelling of the fibrositic muscle is a prominent feature of the acute stage, and is also present in chronic fibrositis, especially apparent in the trapezius, deltoid, glutei, gastrocnemius, etc., where the whole volume of the muscle appears to be increased. These four changes can always be found if carefully looked for, and although divergent views are held as to the underlying causes of fibrositis, most authorities, Stockman, Luff, and others in England—Lange, Ruhman, etc., in Germany—have described these changes very accurately.

It is not the object of this paper to enter into the question of the cause or causes of this curious and typical overgrowth of the fibrous tissues. Bacterial infection and its resultant toxins, errors of metabolism, chill and exposure, trauma, heredity, the menopause, faulty habits of life, all these have been accused in turn; probably all these factors play a more or less important part.

The medical treatment of fibrositis concerns itself with the eradication of any focus and the thorough elimination of any toxin found in the body.

The foundation of a successful treatment by physiotherapy depends first of all on a very thorough examination. The physiotherapeutist must know exactly what to look for, and where and how he or she is likely to find it. The examining fingers must know how to palpate to localise the hard areas and fibrositic foci. The degree of hardness differs much and depends a great deal on the chronicity of the case. In acute cases such as after extreme and sudden exposure of the heated skin to cold, or after an attack of influenza, or after some use or overstrain of muscles, as in riding, mountain-climbing, etc., the indurations are not always very easy to find and are very small. A careful and minute examination can only be made with completely relaxed muscles, and even then the slight change in the muscle structure of a recent case is often missed. A definitely chronic nodule is much easier to find and localise, though even here mistakes are made.

Hard as it is, the fibrositic nodule is never as hard as a scar which should not be mistaken for it, nor yet has it the chronic induration of an old phlebitis. Treating the latter by vigorous methods might cause disaster.

*Reprinted from The Journal of the Chartered Society of Massage and Medical Gymnastics.

The tiny round nodules that often follow influenza and chill are mostly found in the neck and intercostal muscles, but are sometimes present in the muscles of the trunk. The nodules of chronic migraine are also small and often definitely located in the neck and upper back muscles. Large spindle-shaped nodules, the result of repeated overstrain, are often located in the big, fleshy muscles such as deltoid, glutei, gastrocnemius, sartorius; the two latter are very favourite sites for these. Whether small or large, acute or chronic, they are exceedingly tender, and wherever they are, the whole muscle is usually as hard as a brick owing to the reflex contraction.

The distribution of these nodules is fairly regular. They are usually found either at the origin of the muscle or near its insertion, or at the junction of the fleshy belly of the muscle with the tendinous part, or along the periphery of muscle. The occurrence of nodules at these sites is thought by Lange to be connected with the relative poorness of the blood stream in these parts. Others again consider fibrositis to be a sensory nerve neuralgia, because the nodules are more frequently situated in parts of muscles where the sensory nerve fibres are most numerous, while there are few or none in the region of the motor nerves. This is nearly always the case in pectoralis major. Tissue drainage is always deficient in these areas, and the products of metabolism and fatigue such as lactic acid tend to accumulate and to create favorable conditions for the formation of fibrous nodules, which are always acid in reaction.

The fibrositic deposits caused by chill and exposure are most numerous in the muscles of the trunk, back, neck, and on the sternal portion of pectoralis major. Also in the tendinous parts of the erector spinae and quadratus lumborum, while those due to strain and overuse are chiefly in the extremities, muscles of arms, sartorius, gastrocnemius, tibiali, and peronei. Those caused by infection and metabolic disturbances may be in trunk and extremities, and a very common and painful site is the abdomen. These latter can be completely removed in one sitting.

The examination, though thorough, must be gentle, as any roughness or forcible digging in of unskilled fingers into the depth of tissue only results in extreme degrees of *defense musculaire*. The patient himself should always be allowed to locate his painful sensations, and relaxation must be absolute and achieved by suitable position, support of muscles, and very often by distracting the patient's attention if his co-operation cannot be enlisted. The skin must be quite soft and supple. This is best done by inunction with liquid paraffin, which must, however, be completely removed by spirit before the treatment begins. Not only the indurated areas should be palpated, but the careful examination must be extended to the whole of the musculature of the limb or part in question because as one surgeon has said, "Muscles are links in a chain of joints." They act together and are apt to suffer together. This is specially important in case of strain where the muscles of the sound side tend to suffer through overwork, also in rheumatism with its strong tendency to symmetrical change.

The prognosis is promising provided that the underlying condition receives adequate treatment, and that both patient and operator be endowed with endurance and philosophy, and the latter with the necessary skill. The treatment does not spare either. Energetic as it is, however, patients soon learn to have confidence in a really deep and searching treatment, provided the pain is decreased. I may point out that gentle, soothing massage, though it may form a good finale to half an hour's deep treatment, is in itself quite useless. The treatment of fibrositis is a highly specialized affair and cannot possibly be painless, in fact it represents a complete upheaval, for here we have to do with deposits of waste matter. These must be attacked, disturbed, and finally moved on and resorbed. There will, of course, be pain and some local swelling which may even extend to the neighboring glands. This is not, as some think, a sign of too forcible handling, but merely shows that toxins have been disturbed and the eliminative powers of the body stimulated to deal with them. General massage is no use here. To begin with the time is far too short, and what time there is should all be devoted to the treatment of the painful areas.

The Treatment of Fibrositis has three main elements:

(1) Heat.
(2) Special massage of the infiltrated areas.
(3) Movements and active exercises.

This heat can be either radiant heat, given by a high power carbon filament lamp, or better still infra-red light which promotes a rapid heating up of the whole surface and stimulates the sweat glands.

Diathermy is often advocated as a cure for fibrositis, but neither the application of superficial or deep heat *alone* will cure. To bring heat to the surface of the body, or even to heat tissues through alone, will only result in more chronic congestion and retardation of the blood stream, and therefore more deposition of waste matters, unless this heat be followed by skilled and highly intelligent massage.

Even diathermy with its penetrating heat and the strong hyperaemia it promotes, is not enough to do away with the fibrositis indurations and nodules, though intensely useful at a certain stage in promoting the absorption of the broken up nodules and indurations. These must be treated first, or after the current has passed through the tissues, by a special form of massage, consisting of the gliding of a practiced, strong, yet sympathetic hand over the skin in circular movements with very gradual penetration, at first almost without the patient's knowledge, and later, if he be sensible, with full co-operation, gradually getting beneath the subcutaneous fat into the depth of the muscles which must be completely relaxed. Then, when the nodule is located, the movements become more penetrating and purposeful.

These movements are, in reality, special frictions in a circular direction over the whole indurated area. They are given with strong hyper-extended fingers, the left hand reinforcing the right, working very slowly in concentric circles. The masseur or masseuse must strictly avoid flexion of his or her own elbows which weakens the efforts and exhausts the strength of the operator. The whole treatment should be carried out with extended arms and the whole weight of the back thrown into the work as small, deep excursions are made into the depth of the tissues. This sounds a trifle drastic, but is infinitely less trying to the patient than sudden clawing movements with one brutal thumb. Now and again deep pressure, always in a circular direction, can be used with the fist or the hand flexed at the first metacarpal phalangeal joint. This gives a slightly wider area of pressure.

There are still old-fashioned masseuses and doctors without any practical knowledge of massage, who condemn this method as rough, brutal, and unnecessary, but these people have neither had fibrositis themselves, nor have they succeeded in curing it in others by massage. It is quite impossible to cure fibrositis without pain. The pain, however, can be minimised if this friction be skil-

fully and gradually introduced, and followed by deep stroking to promote resorption. These stronger movements can also be interspersed with kneading and strokings, always in the direction of the lymphatic flow. If done while heat is being applied in the shape of an infra-red light, this will be found to be an indispensable aid. Messrs. Stanley Cox, Ltd., of 39 Gerrard Street, have a delightfully made and practical infra-red lamp which is portable, costing only three guineas, with carrying case. It can be supported on a little stand and placed in turn over each area treated. It gives immense relief to the patient and greatly aids the massage.

This strong and vigorous massage is only meant for the treatment of muscles and their fibrous appendages. It must be clearly understood that it is not applicable to arthritis. Here it is quite possible to increase inflammation and bruising of the synovial fringes of rheumatic joints by too powerful massage. Nor should it be done directly over a nerve trunk. This is not always quite easy to avoid, but the masseuse must be specially careful to avoid bruising the muscular spiral nerve or the median in the arm, the sciatic and peroneal nerves in the leg at certain places along their course. Strong massage over these areas will cause definite radiating pain quite different from the pain caused by nodules.

As regards time, the strong, vigorous massage of each indurated area requires ten to twelve minutes with occasional relief in the shape of rest pauses and strokings, and each strong friction should be applied with a certain surging effect, now stronger, now weaker. If very diffuse, the indurated area must be taken gradually and in sections, moving on to a new place when the pain has left the first. If very sensitive and tender after such a powerful treatment, the next two treatments should be milder.

Results of this powerful treatment are a twofold reaction. This is:

(1) General.

(2) Local.

The general reaction is a feeling of intense fatigue, even exhaustion. Many feel as if they had been mangled out or beaten. The more areas treated, the greater is the general reaction. The best remedy for that is a day or half a day in a warmed bed, taking an internal hot water bath in the shape of a glass of hot water every two hours. It completely disappears giving place to a feeling of relief and invigoration.

The local reaction, unless thoroughly explained to the patient and to an experienced doctor, is apt to cause some little alarm. It does not come on until after two or three treatments, and consists of a definite skin discoloration over the treated parts, or over the parts where the nodules are present. This is a very characteristic and specific reaction, taking place only in the affected muscles and never in the others, though subjected to the same treatment. The skin is first red, and in a day or two it becomes yellow and ultimately goes through all the colors of the rainbow, disappearing altogether in five or six days in spite of continued treatment. It is due to tiny haemorrhages in the fibrositic area where there appears to be some degeneration of the walls of the vessels, and it is, of course, caused by the squeezing and pressing out of the nodules. The resorption of these haemorrhages is made more rapid by inducing an active hyperaemia by passing a diathermy current for fifteen minutes followed by a few minutes deep stroking. If no diathermy is at hand, much the same result can be got by antiphlogistin applied at home at night.

As to the number of treatments necessary, it is wiser not to be too definite, for this must vary with the chronicity, the condition of the patient's skin, and his powers of endurance. Half measures are no good, and massage must be continued until the pain and discoloration has disappeared and the muscles have become soft and supple.

A very essential part of the treatment is active movements which must be begun after one or two treatments have been given, and when the pain has been a little relieved. These movements must be faithfully carried out each time in the fullest possible range, and not left to the patient's discretion, for with few exceptions patients loathe and bitterly resent any self effort, and in this respect they display the energy of a snail. How many patients suffering from fibrositis, or any other condition, ever fully extend their arms above their heads, or really hyperextend and thoroughly stretch the neck and back muscles during the course of the day? Most of the affairs of life, dressing, eating, writing, sitting in cars, etc., lead to flexion. Fibrositis about the elbow joint is comparatively rare, for this joint is continually not only flexed but extended in all the small doings of life, and has a very good blood supply. It is a very different story, in the ankle, foot, small muscles of the fingers, etc. These joints are seldom, if ever, stretched to their full range.

Treatment such as I have described is really successful in its results, and I have yet to meet the patient who says that the time spent and the pain endured have been in vain. To be successful, certain conditions must be fulfilled:

1. The treatment is best given in the patient's own house, for it is both fatiguing and painful, and should be followed by a long rest in bed, for the heat and vigour of the treatment leave the massaged parts in a state of hyper-susceptibility, and in that state the slightest chill or strain from boarding an omnibus, strap-hanging, etc., will undo the whole of the good achieved and lead to fresh inflammation and more deposits.

2. Much missionary work must be done in regard to that vital organ, the skin, and patients must be taught that the skin is not only a covering, a buffer, between them and the slings and arrows of a rude world, but a great organ, in which toxic products must not be allowed to accumulate. It must be trained, toned, and fortified. This cannot be done by dwelling in hot rooms, overclothing, lying under stuffy eiderdowns, or by constantly taking hot baths, which merely lead to more chronic congestion unless they are followed by a brief cold sponge or douche, and vigorous friction with a rough turkish glove or towel. Short air baths of one minute in a cooler bedroom are possible for every one, and are wonderfully bracing to the skin, if followed by a short and vigorous program of active exercises for the limbs, neck, and trunk muscles. All these make the skin resistant and supple, increase the local circulation, and make the muscles more capable of exercise, and tend to prevent the formation of fresh nodules.

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EDITORIALS

Sir Robert Jones

Sir Robert Jones, whose name is revered by all who are interested in crippled children, died from a heart attack in Llanfechain, Montgomeryshire, England, on Saturday, January 14th. He was 74 years old.

It was often said that he performed "white magic" as he was chiefly intersted in work among crippled children and was the first to achieve permanent cures for sufferers from tuberculosis of the spine. The "social salvage of the cripple was his creed." It may be said that the link between the development of orthopaedic surgery in the United States and England was the friendship between Sir Robert and the American orthopaedists.

During the world war he held the rank of major-general and was knighted in recognition of his remarkable services in reclaiming the maimed. When the United States entered the war he was instructor in war surgery to the American medical officers. For this he received the Distinguished Service Medal in 1919.

Sir Robert will be missed, perhaps chiefly in Liverpool where for forty years he worked among the poor.

Convention Call!

Time—June 14, 15, 16, 17.
Place—Chicago.
Hotel—Knickerbocker.

First of all, we urge you to make your hotel reservations early—at once. June is a time of passing tourists, the A. M. A. meets in Milwaukee during the same week, and the Century of Progress opens up the first of June. You see, therefore, the importance of very early reservations, for lovely as are the parks in June, the benches are rather hard.

The program is not yet completed, but you may be sure the committee will make every effort possible to make the convention worth while. With the A. M. A. meeting near-by we should be able to obtain good speakers, and with the Century of Progress to help attract you, we shall do our utmost not to disappoint you. It has been so arranged that you may go to Milwaukee at the beginning of the week for any part of the A. M. A. program which may interest you, then you may come to Chicago in the middle of the week for our own meetings.

You have all heard of the City of Chicago—have heard reports of all sorts, for surely nothing has been left unsaid. The trouble is, the worst is spoken the loudest. Therefore, we of Chicago, do urge you to come and see for yourselves that we are good as well as bad—that hoodlums do not loiter around every corner—most of us have never seen one—and that we have enough of worth to make your visit a profit to you even though there were no convention or Century of Progress.

Hotel Knickerbocker is located on the Near North Side along the famous Gold Coast where the roar of the lake mingles with the hum of The Drive—The Drive over which pass more automobiles than can boast any other city in the world. The hotel is within walking distance of the Loop, of the city's Bohemia, and of the slums. And all for the price of $3.50 for single room and bath, or $5.00 for a double room.

Was there ever greater inducement to "Go to convention!"

Southern California Chapter

The Southern California Chapter has again started its activities for the year with its usual enthusiasm and good attendance at its meetings. Our first meeting, held on Oct. 3, was addressed by Dr. C. L. Lowman of the Orthopedic Hospital and our second one on Dec. 7, by Dr. Samuel Mathews, both giving much of practical value.

The meetings are held every other month and the program committee chairman has always obtained an interesting speaker for the evening. With the willingness to help in every way possible, granted us by the medical profession in Los Angeles, our meetings cannot help but be instructive and of intense interest to all who attend.

L. H. G.

Physiotherapy Demonstration

On Friday night, Nov. 18, the Texas Chapter gave a demonstration program for the women students of Baylor University College of Medicine and the women physicians of Dallas, at the Carrell-Driver-Girard Clinic. The program started in the gymnasium with a short introductory talk by the president in which the definition of physiotherapy was quoted and the requirements for membership in the national association outlined.

Muscle testing of arms, legs and abdomen; and muscle

training exercises were demonstrated by Misses Irene Lang and Eloise Hartman.

Scoliosis and posture training including flat feet, were shown by Miss Winifred Moore. One of the Scottish Rite Hospital patients served as subject and added to the program materially.

Miss John Moreland presented Electrotherapy with a brief outline of its uses before demonstrating the modalities in another part of the building.

While moving from the gymnasium to the treatment rooms, Mrs. Curtis Jones explained some of the orthopedic uses of Hydrotherapy. The whirlpool baths were shown; and underwater treatment for Infantile Paralysis with a patient from the clinic was given by Miss Hamm, an assistant, with explanations by Mrs. Jones.

In the treatment rooms Miss Moreland demonstrated the uses of infra red and ultra violet light, autocondensation, diathermy, including pneumonia and fever treatments, and the Smartt machine.

Massage was demonstrated by Miss Ella Mary George.

We were disappointed in not having Miss Isabel Cameron present her occupational therapy work with the crippled children at Scottish Rite Hospital, but substituted for that a visit to the workshop at the hospital which is just a block from the clinic where our meeting was held.

Refreshments served at the clinic ended an interesting and, we hope, instructive evening.

E. M. G.

Eastern Section Convention

The New York and the New Jersey Chapters have cordially invited the Eastern Section of this association to hold its convention in New York City from March 30 through April 1. Miss Mary Elizabeth Hibbler is the Local Chairman and a varied and stimulating program has been arranged. The business meeting on Friday morning is important as there will be a discussion of the revision of the Constitution. This is important!

Registration will be on Thursday evening and Friday morning. Come to all or any of the meetings. Those who wish to attend the dinner on Friday evening should make reservations with Miss Hibbler before March 15. (Dinner will be informal.) Our meeting place will be the Hotel McAlpin, Broadway at 34th Street. Make your reservations early: single rooms without bath—$2.50 and $3.00; with bath—$3.00 and up; double rooms without bath—$4.00 and $4.50; with bath—$4.00 and up.

Thursday, March 30, 1933

6:30 P. M.—Registration.

8:00 P. M.—Address of Welcome, Dr. A. B. Hirsh.
Physical Therapy in the Public Schools of N. Y. City, Dr. Adela J. Smith.
Physical Therapy in Industry, Dr. Henry H. Kessler.

Friday, March 31, 1933

8:30 A. M.—Registration.

9:00 A. M.—Business Meeting.

1:30 P. M.—Demonstration of Creeping Exercises.
Electrically Induced Hyperpyrexia, Dr. William Bierman.
Demonstration of Margaret Morris Movement, Barbara White.
Problems for Technicians in the Administration of Light Therapy, Dr. F. H. Krusen.

7:30 P. M.—Dinner—Hotel McAlpin.

Saturday, April 1, 1933

9:00 A. M.—Demonstration of Hydrogymnastics, Dr. K. G. Hanson.

11:00 A. M.—Demonstration of the Training of the Birth Injured, Dr. Earl R. Carlson.

Constance K. Greene, Chairman, Eastern Section Convention.

Practical Experiences in the Application of Muscle Training in Orthopedic Defects

By Marion Ballantyne, R.N., Supervisor, Winifred J. Hearn, B.S., Consultant, Visiting Nurse Association of Brooklyn

[The authors wish to express their sincere appreciation for the advice and assistance given them by Dr. Jacques C. Rushmore, chief of the Orthopedic Staff of the Long Island College Hospital, Brooklyn, New York in discussing and testing in the practice, the principles and ideas which appear in this article.]

PART III

Four subjects will be considered in this article. They will be discussed in the order named: prevention of deformities; contractures; various theories of treatment; practical aids and devices for treatment.

One of the outstanding problems facing the physician, physiotherapist and the family in the care of orthopedic conditions is the prevention of deformities. For the purpose of illustration we will consider prevention of deformities throughout the three stages of poliomyelitis. The acute and convalescent periods are the time when greatest emphasis should be placed upon prevention of deformities. Frequently one of the duties of the physiotherapist, or nurse, is to interpret the physician's orders to the family and to see that they are effectively followed. As she sees the patient more often and under a more normal situation than the physician she may detect conditions that do not appear at the time of examination and should observe whether or not the part is being kept in a neutral position by the use of apparatus or sandbags. In attempting to support the affected part the position and use of the unaffected regions should not be overlooked. As an illustration: When a single ambulatory brace is worn careful instruction should be given in the proper function of the unaffected foot. Such condition as cavus, varus, multiple hammertoes, recurvatum, and a slight equinus often occur in the non-paralyzed extremity as a result of the improper use of that extremity in the propulsion of the body weight forward in walking. In an attempt to clear the ground with the braced leg the individual exaggerates the transfer of weight to the outer border

of the non-paralyzed foot. To prevent this before deformities appear, early instruction should be given in transfering weight through the center of the foot.

As soon as any maladjustment of apparatus, support or lifts on shoes is observed this fact should immediately be reported to the physician or clinic.

All postures should be noted in the supine, sitting and standing positions in order to prevent undue muscle strain and possible deformities. For example: if there is a unilateral atrophy of the buttocks a pad of sufficient thickness may be inserted under the smaller buttock to equalize the pelvis and aid in preventing a curvature in the spine. This is advisable in the supine as well as in the sitting position.

When contractures occur and the physician advises correction by manual stretching an effort should be made to gain the patient's cooperation. Otherwise the tension present in the muscle which is the contracture is increased by fear of pain on the part of the patient. This increased tension can become so strong that the force needed on the part of the operator to overcome the resistance may be so great as to cause a fracture. This may result when some bone pathology is present due to disuse over a long period of time, or due to some obscure cause. This is particularly true of a contracture of the quadriceps. The added resistance of the patient should be reduced to the minimum. This can be accomplished by transfering the effort to the patient. For example: if the quadriceps is contracted the patient lies on the affected side. The operator places a finger on the posterior aspect of the knee and continues to urge the patient to "pinch the finger" as she assists him in flexing the knee. By the use of such a phrase or similar expression the patient's interest and effort is centered on an external object, (such as someone's finger) rather than the actual movement. The pressure exerted by the operator should be placed on the part where the greatest mechanical advantage is to be derived and the least strain on muscles and bone. Such a position would be near the joint where the contracture occurs.

Since the theories and methods advanced by Dr. Lovett there have developed some variations which have also proved to be effective.

The general procedure in giving exercises has been to move the part through the complete arc of motion. However, it is the opinion of an orthopedist of note that this principle is in opposition to the law that a muscle tends to regenerate the closer its origin and insertion is brought together. Therefore he advises for his patients that the muscle to be exercised be allowed to function over a much reduced arc. For example: if the deltoid is involved the arm is passively placed at a 45 degree angle or more depending upon the degree of power. Then the patient carries it to a 90 degree angle.

One group of physicians issue orders for bilateral exercises for their patients. This procedure is based on the fact that there are connecting fibres in the spinal cord and brain which pass to both sides of the body. Increased stimulation of nutrition in the affected part may be caused when bilateral motions are performed. This same group advises massage of six to eight strokes per minute at the rate of one minute intervals for five minutes, three times a day. Their belief is that such a method eliminates destruction of tissue by fatigue as a result of too much massage. Some physicians advise no slapping or kneading and prefer a dry hand massage.

Frequently demands are made upon the ingenuity of the nurse or physiotherapist to plan devices which will assist in the care and treatment of a patient in the home. Many parents are sufficiently interested to give their aid in the making of them. For instance: One five year old patient of the recent poliomyelitis epidemic was bed-ridden because of his complete paralysis. The physician casually remarked that it would be of value if he could have treatment under water 3% saline solution. Thereupon the family erected a galvanized iron tank five feet long, two feet deep and four feet wide and elevated on a wooden platform 18 inches from the floor. This raised the tank to a convenient height to give the treatment. The tank was kept in the bedroom. The bedroom was next to the bathroom and the tank was filled by means of a garden hose and emptied by attaching the hose to a spigot at the bottom of the tank. It had a cover made in two sections and so easier to handle. When not in use the cover was placed on the tank and thus this space could be utilized. Arrangements were made with the superintendent of the building for the use of one boiler of hot water at a stated time each day. The patient remained in the tank about thirty minutes. More hot water and salt were added if necessary. The first part of the period was devoted to definite movements and the remainder of the time was given to free play. Until sufficient muscle power returned the child was placed on a wooden platform to which pontoons were attached in order to assist in keeping the patient and the platform afloat.

One patient was a great problem not only because of her complete paralysis but because she was easily discouraged when improvement seemed so negligible. She was the asthenic type and as is generally conceded she would have less muscle tone. Therefore the problem was to eliminate as completely as possible all external forces such as gravity and friction. With the physician's approval this was accomplished by the "skate," which was made of a piece of veneer the length of her lower leg from just below the knee to above the ankle joint. On each of the four corners was attached a small roller-bearing castor, which did not raise the platform too high and so did not throw the extremity out of alignment. Between the platform and the castors a wire was wound which kept the castors in the direction the platform was rolling but did not interfere with the movement of the platform on a large board on which she was placed for treatment. It was possible to use the skate for flexion and extension of knee, hip and elbow, abduction and adduction of hip and shoulder. Because of a slight recurvatum the skate was so placed as to give support to the knee. The patient could use the skate in side lying and supine positions. As a result of the use of this the patient is more sensitive to the ability to move a part because the platform moves with the slightest effort. This has produced marked improvement in her interest, effort and optimism. Improvement is evident for now some motion is present without the aid of the apparatus.

In another instance when the physician felt it advisable to keep the patient in his home environment though head traction was necessary it fell to the nurse to devise a plan for such traction. The patient was strapped to a Bradford frame, a Sayre halter was made of flannel bandage with a ring at the center of the top. A hook with a rope was snapped on the ring and the rope was passed through a pulley and around a post of the bed directly above the patient. When sufficient traction was obtained the rope was fastened to the bed. This produced the desired correction for a wry neck and contraction of the posterior neck muscles without causing any degree of discomfort to the child.

A Case of Hemangioma

By Dorthea Sorenson Nylander

In December, 1929, this case was referred for treatment with the Water-Cooled Ultra Violet light.

The patient was a baby six months old, with a large hemangioma extending from the inner corner of the right eye, diagonally downward and outward to about the middle of the cheek, then diagonally upward to the hair line. The superior border extended from the outer corner of the eye, diagonally upward, about parallel to the inferior border.

At age 6 months

The area was quite thick and elevated about one-fourth of an inch above the surrounding skin and extended into the lower eyelid, obstructing practically all vision from the eye. It was of the soft spongy type which blanched out with pressure.

The patient lived some 50 miles from Seattle, and the mother did not wish to hospitalize the baby. It was impossible also for her to bring the child in as frequently as was desired. So it was impossible for us to observe the immediate post-treatment condition; the total span of treatment was also unavoidably lengthened considerably.

After a few preliminary tests, it was decided that 30 seconds with firm pressure gave the desired beginning reaction. As treatment progressed this time was lengthened, and as much area as possible was treated each time.

After reporting for about 35 treatments over a period of nearly three years, the area is now blanched to practically the same color as the normal skin except for one small area ½ inch in diameter on the temple just lateral to the eye. The entire area is now also level with the surrounding skin and is gradually contracting and approaching the texture of the normal skin.

The inclosed photographs will help to show the progress made so far. Unfortunately, we have no close-up photo to show the condition previous to treatment, only snap shots which were taken at home.

DISCUSSION

Herbert E. Coe, M.D.: This case illustrates well the excellent results which may be obtained in this type of hemangioma by consistent, persistent ultra violet therapy. Special care was necessary on account of the proximity of the eye and the lack of cooperation on the part of the little patient. The hemangiomas suitable for this type of treatment are cavernous ones which are soft, raised, rather easily compressible, sharply circumscribed and often showing a tendency to enlarge. They may vary from pin-head size to several inches in diameter and may occur in any portion of the body. It is our observation that those involving mucous surfaces are not suitable for this treatment on account of the delicacy of the mucous membrane. Also, the flat, non-compressible, port wine marks do not respond well.

We prefer this type of treatment in suitable cases to the treatment by radium, because it has been our experience that the resultant skin shows a much more normal appearance. It is smoother, elastic and soft, although it usually shows slightly less pigment than normal and lacks the fine stippled or lined appearance of normal skin. Hard scars, either ridged or stellate, as are frequently seen following the radium treatment practically never occur. This case shows a slight scarring in the middle at the site of a fissured, infected area which was present when the child first appeared for treatment. The only disadvantage of the treatment is the time required and the multiplicity of applications necessary to obtain a satisfactory result.

At age 20 months — At age 3 years 4 months

Physiotherapy in the General Hospital—A Case Report

By Hilda Wilder Jones, R.N.

For the past several years Physiotherapy has held a very important place in the orthopaedic hospitals and private practice of orthopaedic and traumatic surgeons. Much has been accomplished by the well trained physiotherapist in the different types of paralysis and joint conditions with the various modalities (diathermia, hydrotherapy, heat, massage, muscle training and corrective exercises) but there has not been a great deal of consideration given physiotherapy by many of our general hospitals and general physicians, both medical men and surgeons.

It was my privilege to serve for three years in a gen-

eral hospital where physiotherapy work was in its infancy but where the staff doctors were very anxious to prove its merits. After each case had been studied in the various departments those indicating treatment were referred to our department and in many types of cases we were able to give very gratifying and permanent results.

The case I am reporting responded almost beyond our expectations. A patient suffering from chronic colitis, had grown steadily worse over a period of five years with a loss of 45 pounds in weight. The history given by his attending physician, who was very cooperative with the physiotherapy department, was as follows:

Male, Age 40—Business man. Had had the following symptoms: Decided loss of weight, abdominal distress after eating, highly nervous. Insomnia, very little rest at night, even with a sedative. Was able to stay in office only few hours daily.

Treatment: Patient admitted to hospital, complete rest in bed. A. M. Treatment high colonic irrigation followed by diathermy given through large electrode covering abdominal area, large electrode on back; 40 minute treatment given. Afternoon treatment: Patient given general Ultra Violet radiation with light general massage for relaxation. He reported the following morning that he had slept four hours without a sedative. He was placed on a carefully planned diet through the first few weeks, gradually getting on a general diet, excepting of course, highly seasoned foods of any kind.

The patient was discharged after two weeks of hospital care, well on the road to recovery. He reported to the out patient department three times a week for eight weeks, at which time he was tolerating his food very well and had gained 10 pounds. He steadily gained weight for several months, reporting for a treatment occasionally. At the end of a year he had gained 30 pounds, was spending full time at his office and playing golf for exercise.

Three years have elapsed and the patient reported last month that he had gained 45 pounds. He, as well as the attending physician and physiotherapist feel, that the physiotherapy department was largely if not entirely responsible for his recovery.

3701 Maple Ave., Dallas, Texas.

History of the Development of Special Schools and Classes for Crippled Children in Chicago[1]

By Victoria B. Vacha

Chicago, today, is recognized as being among the leading cities of the world in making provisions in her public school system for crippled children. Its organized care of these unfortunate children is regarded as a model and has been followed in many cities in the United States. In tracing the growth of interest in the work for crippled children in Chicago, it is necessary to begin with private activities. The pioneer in this work seems to have been Dr. John Ridlon. "No charity work for cripples," claims Dr. Ridlon without contradiction, "was done in Chicago by anyone having had orthopedic training before I came here in 1892."[2] In the summer of that year, Dr. Ridlon arranged two weeks outing for ten children on the farm of George Pullman, he himself attending to their surgical needs, while Florence Pullman, (Mrs. Frank O. Lowden) furnished the care, support, and nursing for them. The same year, 1892, Dr. Ridlon, established the first clinic for cripples at the Northwestern University Medical School.[3]

The year following, the next step in the work for cripples was taken when Emma Stelle became interested in a home for crippled children conducted on the Northwest side by a Dr. Prince. Dr. Prince had been an episcopal clergyman who became a homeopathic physician. For a time, how long it is not known, he had been taking crippled children into his home; he himself was convinced that they were all hopeless cases. Emma Stelle's interest in the work of Dr. Prince resulted in her establishing the Home for Destitute Crippled Children, which was chartered in 1893. An old residence on the southeast corner of Maypole and Paulina was purchased for $32,000. Dr. Prince agreed to come as the first superintendent on the condition that nothing would be done to the five children he brought with him, without his consent. Dr. Ridlon was the surgeon in charge.[4]

The next important development came from Mrs. William J. Chalmers. She had been a member of the Board of Directors of the Home for Destitute Crippled Children in 1893. After Mr. Eccles, the president of the Board of Directors of the Home, died, Mrs. Chalmers started a movement to establish a convalescent home for crippled children in his memory. By giving entertainments, she raised about $18,000. But since Dr. Ridlon deemed this sum insufficient, the money was put away until it amounted to $20,000. While Mrs. Chalmers was abroad, Dr. Ridlon induced Richard W. Sears to purchase a farm at Prince Crossing—so named after Dr. Prince—Du Page County, for a future country Home. Later a house was built on this property with the money raised by Mrs. Chalmers. This institution is now known as the Country Home for Convalescent Children.[5]

The growth of the work for crippled children in Chicago led to the establishment of an institution for them in a suburb of Chicago, Maywood. A Mr. H. Hart and Miss Kittie Smith, the latter having been a patient in the Home for Destitute Crippled Children, founded the Home for Disabled Children.[6] This was in the year 1909.

Up to 1898 no educational work of any kind was provided in these institutions. In that year, this fact was called to the attention of Graham Harris, president of the Chicago Board of Education. Since his wife and sister-in-law, Mrs. McElwee, were members of the Board of Directors of the Home for Destitute Crippled Children, it was not difficult to interest Mr. Harris in providing special classes for these children. In order to gather in-

[1] This is a chapter of the thesis prepared by Miss Vacha on "The Educational Opportunities for Crippled Children in Chicago."

[2] *Superintendent's Report*, "Exceptional Children and School Lunches," Chicago Board of Education, 1915-16, Pg. 70.

[3] *Superintendent's Report*, Op. cit., Pg. 70.

[4] *Superintendent's Report*, Op. cit., Pg. 70.

[5] *Superintendent's Report*, Op. cit., Pg. 70.

[6] Edith Reeves Sollenberger, *Care and Education of Crippled Children in the United States*, Russel Sage Foundation, 1914, Pg. 188.

formation as to the educational methods used for crippled children, William L. Bodine, Superintendent of Compulsory Education, was sent to Boston to visit a private school for crippled children there. Finally in January, 1899, a class for seven crippled children was established in "rented quarters at the corner of Ogden and Madison street," with Emma Haskell as teacher.[7] Mrs. Haskell is said to have had experience with crippled children, having conducted a private school for crippled children in a "store on West Lake Street for two or three years previous to 1900."[8] The school on Ogden and Madison was the first class of its kind to be conducted under the supervision of the Board of Education. Horse drawn cars, also called buses were rented for transporting the children to and from school. No mention is made of the size of the school but two pictures in the School Report for 1900 show a regular classroom and a bar room called a gymnasium.

In the Spring of 1900 a class was started for crippled children in the Fallon School at Forty-Second and Wallace Streets. The teacher was Florence Prouty (Mrs. Florence Prouty Robinson). The combined enrollment in June, 1900, for this class, and the one on Ogden and Madison Streets, was forty-five. By 1901 the number of pupils had increased to fifty-three. It seems, however, that the number of crippled children who needed education were greater than the provisions already made for them. "There are twelve on the waiting list and applications for admissions are constantly pouring in."[9]

It has already been said that the children were transported to and from school in a bus. By this time four such buses were necessary. In order to provide additional care for the children, each bus had not only a driver but also an attendant. In the winter the buses used were closed and heated, whereas in the spring and summer, they were open wagonnettes. There was no charge for transportation. "Chicago is the only city in the world in which free transportation is an adjunct of the public school system."[10]

Early in the organization of these special classes for crippled children, their teachers recognized their responsibility for including some kind of industrial work in the curriculum. A report in 1901 by Emma S. Haskell gives an interesting insight into the curriculum.

In addition to the regular curriculum required in other schools, instruction is given in sewing, darning, crocheting, fancy needle work, basket making, and other construction work. Admirable work is done by girls of ten and twelve years—the boys are given the same training. Great stress is placed on this industrial training which represents such an important factor in the education of these crippled and deformed children. To make these unfortunates self-sustaining, to send them into the world with a knowledge of industry helps them not only to become independent but to help others more fortunate.*** It is hoped that this industrial training will in time make them good and useful members of society.[11]

Up to this time the school on the west side at Madison and Ogden Streets is referred to as the West Side School but the School Report for 1902 makes no mention of this school. Instead it speaks of classes for crippled children in the Tilden Public School which was situated at the corner of Lake and Elizabeth Streets.[12] (The Tilden School is now the Winchell Continuation School for Girls.) In the Tilden School, three teachers were necessary for the crippled children who numbered sixty-seven. At the Fallon School the number of crippled pupils was thirty-two and they had one teacher.

The following year (1903) the enrollment of the crippled children in the two schools had grown to one hundred eighty-five. Six buses were necessary for their transportation.[13] But the next year, 1904, the enrollment dropped to one hundred forty-eight.[14] It is impossible to account for this decrease in enrollment.

Up to the year 1903 the educational arrangements for crippled children were made on the authority of the public school management, but on May 13 of that year an act was passed by the state, authorizing school districts managed by boards of education to establish and maintain schools or classes for crippled children in public schools, and authorizing payment therefor from the State Common School funds.[15]

Education for crippled children was thus sanctioned by state authority. In September of that year, the state granted Chicago permission to maintain public school classes for crippled children. The size of the class was set at a minimum of fifteen and the age limit was put at six to twenty-one years. This act provided State financial aid for schools and classes for crippled children in the Public School System.

In passing an act authorizing special schools or classes for crippled children, the State also exercised some supervision over the appointment of their teachers. The same month in which permission was officially granted to maintain classes for crippled children brought a letter from the Superintendent of Instruction of the State of Illinois, which "satisfactory evidence having been furnished that they hold valid teachers certificates as provided by law,"[16] ratified the appointments of Emma S. Haskell, Mildred A. Holinger, Minnie S. Marquardt, and Florence Prouty as teachers of crippled children. Later requirements for teachers of crippled children will be more than regular teachers certificates for the Public School System.

In 1904 a classroom was opened for children on the south side in the Mark Sheridan School at 533 West 27th Street. At the end of this year, the total enrollment for the five classrooms, three of which were in the Tilden, one in the Fallon and one in the Mark Sheridan Schools, devoted to the education of crippled children had grown to one hundred seventy-nine.

Schools which were built for normal children were not adequate for the handicapped in these special classes. This fact was recognized by the Board of Education in the year 1905. As a consequence a special school was ordered by them. The school report speaks of this, "When the new school for crippled children on the West Side, now ordered by the Board, is completed, three rooms in the Tilden School now occupied by crippled children will be released."[17] But the plan of building one special school was changed to a plan of building three, one for each side of the city—north, south and west sides.

For each of the proposed buildings, the Board appropriated $100,000. The land was bought. The architects plans completed. The warrants to pay for the building were drawn but they were not signed. The Board hesitated. The advisability of building three schools for crippled children was being questioned. Miss Jane Addams and Mrs. Emmons Blaine were among those who

[7] *School Report*, Chicago Board of Education, 1899-1900, Pg. 31.
[8] *Report, Director of Special Schools*, Chicago Board of Education, 1922-1923, Pg. 105.
[9] *School Report*, Chicago Board of Education, 1900-1901, Pg. 107.
[10] *Ibid.*, Pg. 107.
[11] *School Report*, Op. cit., Pg. 107.
[12] *School Report*, Chicago Board of Education, 1901-1902, Pg. 80.
[13] *School Report*, Chicago Board of Education, 1902-1903, Pg. 76.
[14] *School Report*, Chicago Board of Education, 1903-1904, Pg. 57.
[15] *Ibid.*, Pg. 25.
[16] *School Report*, Op. cit., Pg. 24.
[17] *School Report*, Chicago Board of Education, 1904-1905, Pg. 34.

questioned the advisability of building three schools. They sought the advice of Dr. Ridlon. On his suggestion a survey of the city was undertaken by the Board to find out where most of the crippled children lived, and he himself was delegated to make it. In his report of the survey, Dr. Ridlon recommended that but one school be built at this time, that it should be located on the west side not too far away from the Home for Destitute Crippled Children. He suggested that the school be built close to the Home so that it might provide surgical care for the children in the school, and the school provide education for the children in the Home.[18]

In 1906, the one special school building for crippled children was finally ordered, to be built on the southeast corner of Ashland and Park Avenues. (Park Avenue has since been changed to Maypole.) In September, 1907, the school named Jesse Spalding, after the father of Mrs. Graham Harris, was ready for occupancy. The cost of it was $72,000. It consisted of four classrooms, office, doctor's room, kitchen, dining room, and industrial room or rooms. The building was especially designed for crippled children and to be used exclusively by them. To eliminate stairs the building was raised only slightly above street level. An incline led to the attic which contained the industrial rooms. Ten years later, the building was enlarged. In 1916 an addition at a cost of $82,000 was added, consisting of four classrooms, an assembly hall with a stage, restrooms, receiving rooms, bathroom, glass enclosed sun rooms, toilet, and three large industrial rooms.

The special school, as well as the special classes for crippled children in the regular schools, were slow in increasing in their enrollment. Whereas in six years prior to 1906 the enrollment had grown from forty-five to one hundred seventy-nine, at the end of seven years after that date, the enrollment reached only one hundred ninety-eight. The first reason for this may have been the criterion for entrance. The criterion was the child's helplessness, its ability to get to and from school and climb stairs. Many children who could walk but suffered from other handicaps were denied admission to the special classes. For example, a child who had a paralyzed arm and for that reason was severely handicapped by comparison with normal children was denied entrance to the special classes for crippled children.

The second reason was the policy begun in 1906 to transfer crippled children to the regular schools. Up to 1906 crippled children were being constantly admitted to the special classes and nine were being transferred to the regular schools. As a result these classes were exceedingly overcrowded. In 1906 the Board of Education employed Dr. John Ridlon to make a survey of the children in the special classes, and recommend for transfer all children that he thought did not need transportation. The outcome of this policy was a decrease in enrollment from one hundred seventy-nine in 1906 to one hundred twenty-seven in 1907. After this the enrollment increased, but it increased slowly.

Other than data on finance and attendance no specific mention is made of the special school and classes for crippled children between 1908 and 1910 in the School reports.

Up to 1914 the major concern for crippled children was their educational and industrial development. Little or no attention was paid to the possibility of physical rehabilitation. The credit for the beginning of the important work in behalf of crippled children and its development "not only in Chicago but in the country at large is due to the remarkable genius of Mrs. Rose Kearney Rudolph, teacher of physical education and the splendid initiative of Miss Jane Neil."[19] In the fall of 1914 Mrs. Rudolph was assigned to the Spalding School as teacher of Physical Education, and Miss Neil was assigned as principal.

Physical education for crippled children was introduced prior to the date 1914.

In 1910, at the request of the principal, one of the men teachers of Physical Education was assigned to the Spalding School for one day a week. At the close of that school year, the suggestion was offered by Henry Suder, Supervisor of Physical Education, that "more instruction be given these children and that a teacher should be appointed solely for such work."[20]

The physical education given to the children before Mrs. Rudolph was assigned to the Spalding School consisted of little more than games. Their period of physical education was one of amusement. She wondered whether special exercises to overcome their handicaps would not be practicable. Exercise is one of the means of attaining nerve and muscular development which is one of the objectives of physical education. The realization of this objective of physical education is comparatively simple with children whose nerves and muscles function normally. But it is not so simple with children who come under the category of crippled. There is the problem as to the extent in which it is possible to recall the functions of latent or weakened nerves and muscles.

With this problem in mind, Miss Neil and Mrs. Rudolph visited orthopedic clinics and consulted with surgeons. In 1914, they took a nineteen-year-old girl, who was an infantile paralysis case confined to a wheel chair, to Dr. Ryerson of the Home for Destitute Crippled Children. They called to his attention the possibilities of applying exercise to the affected muscles. Acting on his advice, a series of exercises was started to rehabilitate these muscles. The experiment was successful. Today that same girl is able to drive her own car and recently drove to California. She isn't completely cured but she has improved to the point of independence. "Before physical rehabilitation was undertaken there were twenty-eight wheel chair cases in one hundred seventy-five, at the present time (1930) there are only thirty-seven in seven hundred fifty."[21]

The entrance of physical rehabilitation into the special school and classes for crippled children radically changed the aim of the special school and classes as well as the criterion for admission. The criterion for entrance heretofore had been one of locomotion. But now the criterion was different. It became the question, "Has the child a physical handicap which will be an impediment in industry and which the crippled children's schools can correct or at least improve?"[22] On this basis all children, no matter how slight the physical handicap may be, were admitted and are still being admitted provided that they can be benefited by the opportunities for physical rehabilitation offered in the special schools and classes. The major aims of these centers for crippled children became, "to give every child the best physical condition it is possible for him to attain; the best education it is possible for him to assimilate, and to help him find his place in the world's work."[23]

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[18] "Exceptional Children and School Lunches," *Superintendent's Report*, Chicago Board of Education, 1915-1916, Pg. 72.

[19] *Report of the Director of Special Schools*, Board of Education, Chicago, 1922-23, Pg. 112.

[20] *School Report*, Chicago Board of Education, 1910-1911, Pg. 151.

[21] *Unpublished Report, Director in Charge of Special School*, Chicago Board of Education, 1929-1930.

[22] Jessie L. Stevenson, *Crippled Children in Chicago*, Community Trust Survey, 1923, Pg. 53.

[23] Jane A. Neil, *Unpublished Report*, 1924.

On their own initiative Miss Neil and Mrs. Rudolph took children to orthopedic clinics for one year before the Board of Education provided transportation to the clinics. Transportation to clinics was provided in 1915. No work was done without a doctor's advice. Every child was registered either in a clinic or with a private physician. The physician prescribes all the necessary activities for the child.

In the very year of her appointment Miss Neil asked the Board of Health to send a nurse to the Spalding School for two hours a day. Later, in the year 1916, Miss Neil succeeded in enlisting the aid of the Visiting Nurse Association (V. N. A.) and the field nurses of the Municipal Tuberculosis Sanitarium (M. T. S.) who came to play an important role in caring for handicapped children.

Before it became associated with Miss Neil "the Visiting Nurse Association began what is known as the 'Infantile Paralysis Aftercare Division' of its work."[24] Their project was originally intended for infantile paralysis cases only, but it gradually broadened to include all types of orthopedic handicaps which surgeons believe can be improved by massage, graded exercise and home care. In the beginning the majority of the children treated by the Visiting Nurse Association were under school age and they were treated in their home. As soon as they entered school the work became increasingly difficult since all home calls had to be made on Saturday. Through their association with Miss Neil the nurses could continue their care of the children in the special schools themselves. This was a saving of time to the nurses and an aid to the already overburdened physiotherapists, teachers of physical education in the special schools.

The efforts of Miss Neil led the Municipal Tuberculosis Sanitarium to inaugurate its policy of providing nurses for the care of children with tuberculosis bones in the special schools. The nurses assigned to the special schools assisted the physiotherapists in caring for the children. The work of the Municipal Tuberculosis Sanitarium nurses in the special schools and classes consists now of nursing, home visits, supervision of nutritional groups, violet ray treatments and instruction of mothers. Quartz lamp treatment was introduced in 1928 when the Municipal Tuberculosis Sanitarium presented the Spalding and the Christopher, a school established in 1927, with quartz lamps.

During the period of sixteen years the educational arrangements for crippled children made by the Board of Education was for the elementary school period. But in 1916 through the efforts of Miss Neil, a high school department was established for crippled children in the Spalding School which is at the present time a branch of the McKinley High School.

Under the able guidance of Miss Neil the scope of industrial possibilities for crippled children was also broadened. Beginning with January, 1916, the number of industrial courses were increased. These industrial courses were given, not only for possible future economic independence, but also for their educational and rehabilitative aspects. Sixth, seventh, and eighth grade pupils were given seventy-five minutes of shop work daily. The fourth and fifth grades were given forty-five minutes. As the result of Miss Neil's efforts, courses were offered in manual training, printing, cooking, sewing, lacemaking, weaving, and basketry. Some of these courses were already in the curriculum, but it is impossible to say which ones. Cobbling was added by her to the curriculum of her school although it had already been offered in 1914 by a teacher on her own initiative in the special classes in the Fallon School. Woodwork was also introduced by her and was assigned to the fifth and sixth grades.

The improvements initiated by Miss Neil in the Spalding School were almost immediately adopted by the special classes for crippled children in the Fallon and Mark Sheridan schools. The progressive and efficient methods of Miss Neil increased the number of applicants for these schools, finally resulting in overcrowding. The addition to the Spalding School already spoken of, was necessitated by the increased enrollment. In the Fallon school the two rooms used for crippled children on the ground floor and the two portables, which had been added some time before, proved inadequate. In 1918, runways were installed in the old building, and two floors of the old building as well as one of the new addition were given over to crippled children, being remodeled for them.

In 1919 four classrooms which were temporarily vacant in the Summer School at 715 South Kildare Avenue, were opened as a center—this unit was closed in 1924. About the same time a north side division was begun at the Jahn School at North Lincoln and Belmont Avenues, the first and the ground floors of the school being given over to it. This last arrangement was made possible by shifting school boundaries for normal children. Runways were installed to the first floor which contained a lunchroom, household arts room, manual training room, and six classrooms. On the ground floor were located shops and rooms for exercises.

In 1923 the Mark Sheridan Center was closed and a unit consisting of two classrooms, shops and a lunchroom was opened in the Taylor School at 9912 Avenue H. This division was to care for children in the South Chicago area.

These makeshift attempts to provide centers for the crippled children were far from satisfactory. The new methods of dealing with orthopedic crippled children had improved their mental and physical condition to such a degree as to justify the labor and money expended. But if this work was to continue more schools specially devised for this work were needed. On the south side the numbers in the special classes increased to such an extent that a special building became a necessity. To meet this need the second special school, the Christopher School, was built. It is located at 51st and Artesian.

The Christopher opened its doors in January, 1927. All the crippled children of the Fallon School were transferred to this new school. The Fallon School, which had been used as a center for classes for crippled children since 1900, was torn down in 1928. In October, 1929, a branch of the Lindbloom High School was opened in the Christopher School.

The Christopher School was named after Dr. Walter S. Christopher. He was a member of the Board of Education from 1898 to 1900. He was responsible for the introduction of a system of medical examinations in the Chicago Public Schools, and the Child Study Department. He died on March 2, 1905.

In 1927, a little while after the Christopher School was completed, a new Spalding School was begun to be erected on a much larger scale than the old one. Of the old building only the assembly wing was retained which was incorporated into the new building. The new building is built in the shape of a maltese cross and occupies more than half of the block between Maypole and Washington facing on Ashland Boulevard. It is the finest building of its kind in the world. Every bit of its construction takes into consideration the handicapped

[24]Jessie L. Stevenson, *Crippled Children in Chicago*, Community Trust Survey, 1923, Pg. 53.

child who will work, play and recuperate within its walls. The cost of the new structure is in no way proportional to the untold happiness it has brought and will continue to bring, to the handicapped children who enter its portals.

In September, 1928, the position of District Superintendent of Special Schools was created for Jane A. Neil. She was assigned this position during the month in which the new school was opened, consequently she never had the opportunity of being principal of the new school. The principalship of the Spalding School was taken away from her to enable her to give her genius and sympathy to all the centers of crippled children. As her successor in the principalship was appointed Charles Myall. He, however, died shortly after, whereupon the present incumbent, Miss Thecla Doniat, was installed.

In 1930 the special classes for crippled children in the Taylor School were moved to the Gompers School. The Gompers School is situated at 12301 South Lafayette Avenue. Its first floor was remodeled to contain six classrooms, two physiotherapy rooms, combined gymnasium and restroom, manual training room, household arts room, library, lunch room and showers. The swimming pool at the Scanlan School at 11725 Perry Avenue was assigned for corrective swimming work. The enlarged new center at the Gompers School aided in relieving the already overcrowded Christopher School.

At present plans are under way for the erection of two new schools. One is to be located at Foster and St. Louis to care for the north side and replace the Jahn School, and another at 83rd and Laughlin to care for the south side. The plan for a special school for each side of the city which was rejected in 1906 is thus coming back again.

The care of the crippled children did not stop in the centers, classes or schools. In 1914 the Board of Education began to furnish besides teachers for children in hospitals. In that year it assigned a teacher for bedside instruction to the Home for Destitute Crippled Children. This year another teacher was appointed to the Cook County Hospital for the same purpose. In this hospital a room was set aside for instruction of the children who were able to get around in wheel chairs.

The care for crippled children was further extended to summer camps. In 1908 Mrs. Florence Prouty Robinson opened "Happy Haven" at 3445 Vernon Avenue. She took an average of eight children into her Home. Most of these children, through misfortune, were left without any visible means of support. In 1909 she started a camp at Twin Lakes, Indiana. One year later she had forty-two children in the camp. About ten years after this a permanent site was acquired and a building donated. Between forty and fifty children are being taken to the camp for a period of four weeks during the summer. The Board of Education pays the expenses of the teachers and attendants so that education and rehabilitation may continue through the summer. All other expenses are taken care of by the South Side Crippled Children's Outing Association which was incorporated by Mrs. Robinson.

Another camp was developed under the leadership of Mrs. Haskell, who was the first teacher of crippled children in Chicago. She arranged for outings for children on the west side. In 1922 after several years of activity, the Outing Association for Crippled Children, of which Mrs. Haskell was director, purchased a permanent site on Brown's Lake, Burlington, Wisconsin. Permanent buildings have been erected. They include dormitories, work rooms, assembly hall, lunch room, hospital, and an Alumni room which was last furnished by graduates of the Spalding School. The camp provides for about one hundred fifty children for a six-week camp period. Physical correction and light school work are continued throughout the summer. The expense of teachers and attendants is carried by the Board of Education.

The final expansion of the care of crippled children came in 1929. In that year the Sunbeam League opened a nursery school for spastic children in the Spalding School. The Board of Education furnished classrooms, equipment, transportation, food, physical and speech training.

The same year the Janeil Shops, sheltered workshops for older girls, were opened in the Spalding and Christopher schools. Janeil Shops were named after Miss Jane Neil.

There was also established, out in the Spalding School, a brace repair shop through the efforts of a group of interested mothers who furnished the equipment and the teacher.

There has been a progressive change in the requirements of teachers of physical education who are physiotherapists in the schools for crippled children. In December, 1927, an examination for physiotherapists was offered by the Board. Candidates for this examination have to present in addition to the regular credentials for a general high school certificate, one year of training in physiotherapy, or at least two years full time experience in physiotherapy, subject to the approval of the Board.

This history of the development of public school education for crippled children in the city of Chicago, is to this extent incomplete: it is impossible to name all of the men and women, teachers and principals, who have labored in order that the orthopedic crippled children of Chicago might be truly made "straight." This admirable work could not have been carried on without the aid and excellent cooperation of Chicago's hospitals and famous surgeons who have given unsparingly of their time. Social service agencies, the Visiting Nurse Association, the Municipal Tuberculosis Sanitarium, and the Board of Health have all cooperated most generously. The Board of Education has done everything within its legal limits. Civic and Philanthropic organizations have helped to carry on the work. To quote Miss Neil, "There is no gap." The structure for the physical, academic and vocational welfare of the crippled children in Chicago has been erected by thirty-three years of unceasing, unsparing efforts.

It remains now only to indicate the growth of the crippled children's centers in the number of their enrolled students and in the number of their average daily attendance; the increase in the operating cost per student, and in the cost of transportation. In the following tables the history of these data are given.

TABLE I—INCREASE IN ENROLLMENT IN SPECIAL SCHOOLS AND CLASSES FOR CRIPPLED CHILDREN FROM 1899-1932*

Year	Number of Pupils	Year	Number of Pupils
1899-1900	45	1916-1917	314
1900-1901	53	1917-1918	461
1901-1902	99	1918-1919	552
1902-1903	108	1919-1920	**
1903-1904	148	1920-1921	**
1904-1905	179	1921-1922	1029
1905-1906	179	1922-1923	927
1906-1907	127	1923-1924	987
1907-1908	177	1924-1925	1101
1908-1909	195	1925-1926	1163
1909-1910	208	1926-1927	1410
1910-1911	211	1927-1928	1502
1911-1912	180	1928-1928	1976
1912-1913	198	1929-1930	2269
1913-1914	322	1930-1931	2743
1914-1915	325	1931-1932	2981
1915-1916	**		

*Up to January, 1932.
**Not available.

TABLE II—AVERAGE DAILY MEMBERSHIP OF SPECIAL CLASSES AND SCHOOLS FOR CRIPPLED CHILDREN FROM 1900-1931

Year	Av. Daily Membership	Year	Av. Daily Membership
1900-1901	37.3	1907-1908	119.6
1901-1902	54.5	1908-1909	135.1
1902-1903	56.8	1909-1910	145.7
1903-1904	103.6	1910-1911	134.5
1904-1905	125.2	1911-1912	130.5
1905-1906	122.8	1912-1913	143.7
1906-1907	97.3	1913-1914	206.5
1914-1915	225.3	1923-1924	797.1
1915-1916	281.7	1924-1925	832.6
1916-1917	325.2	1925-1926	979.2
1917-1918	412.6	1926-1927	*
1918-1919	418.1	1927-1928	1187.69
1919-1920	461.4	1928-1929	1364.46
1920-1921	614.5	1929-1930	1574.4
1921-1922	625.5	1930-1931	*
1922-1923	719.1		

*Not available.

Abstracts

By John S. Coulter, M.D.

Cerebral Birth Injuries: Their Orthopaedic Classification and Subsequent Treatment. Winthrop M. Phelps, M. D., New Haven, Conn., Prof. of Orthopedic Surgery, Yale Univ.; J. Bone and Joint Surg., xiv:4:773, October, 1932.

TREATMENT

1. Relaxation. Primary treatment. The principles are based on the actual difficulties found in the examination. In the spastic, the hyperirritability of muscles, resulting in almost simultaneous contraction of antagonists is the important factor. Thus voluntary relaxation should be one of the first aims. In the athetoid, voluntary relaxation is desirable in order to produce volitional motions later, uncomplicated by athetoid movements. The abolition of synkinaesia or overflow can only result from relaxation as a first principle. In pure incoordination, the principle of relaxation is less important, as is the case with tremors. The ability to relax is important to normal individuals. It relieves tension, mental and physical, and is essential in skilled activities. This is stressed in sports. Golfers are constantly adjured to relax. Skilled musicians must keep the body relaxed while playing. In the birth injured, its importance is very great, and it can be taught successfully if cooperation can be obtained. In babies and youngsters, relaxation is a more normal finding and here it is taught to be maintained in the presence of more and more disturbing factors. The clap of the hands will throw many of these into spasm, but a process of conditioning will result in much benefit. In older children and adults, of course, it can be taught more directly. This part of the treatment should precede all other forms, and should last until relaxation can be instituted at will for a long time. Aids to relaxation should be used with caution and, when used, the reason should be kept clearly in mind. Warm baths, sedatives, etc., are the chief aids. But there is great danger of bringing the patient to depend on these aids and to be unable to relax without them. The whole aim of the treatment is thus vitiated as the relaxation is obtained, but is no longer voluntary. Massage may be of help; it should be tried. In some cases the effect will be beneficial, and in others it will be an irritant.

2. Treatment of the neck and trunk. In patients who cannot stand, sit or balance, and who have difficulty in holding up the head, general training must be started on the trunk and neck. The head can often be held up more quickly if a Thomas collar is worn for a time and muscle strengthening given daily for the neck. The collar acts to limit the extreme overstretching which results from the head falling in any direction whenever the patient is lifted. Massage and strengthening exercises of the usual type are used for the neck and back muscles, and balance is gradually attained, in the sitting position, by daily practice beginning with assistance. Often the patient will learn to balance much more quickly while wearing a Thomas collar because of the stabilization afforded the head. The work on the extremities, most of which is done lying down can be begun simultaneously with the strengthening of the neck and trunk.

3. Reciprocal motion. Treatment of the extremities. Treatment should always begin with the proximal joints. A highly trained hand or foot is of no use if there is marked dyskinaesia in the shoulder or hip. The work should begin with these joints and extend gradually to the more distal parts. Often a year or more is necessary on the hips and shoulders alone, and at the end of this time very little improvement will be actually apparent. This must be stressed in the treatment, especially to relatives. The length of treatment, of course, is great—five years usually being the minimum.

In spasticity, the previous training in relaxation is basic. Then, while in as complete relaxation as possible, minimal passive reciprocal motion may be attempted. These motions should be of very small amplitude, and be carried out very slowly, in order not to disturb the relaxation or produce reflex spasm. Later the motion should become actively assisted motion. The amplitude should remain small, the rhythm be marked, and the speed of reciprocation slow. No attempt should be made to emphasize the motion in one direction more than any other. Thus, if the patient is a spastic and the motion being given is abduction-adduction of the hip, the greatest pull is in the adductors, because of their greater strength. If the motion toward abduction should be emphasized, the tendency to resulting spasm in the adductors will be increased and the treatment vitiated. Therefore, the motion should be balanced in amplitude, speed and rhythm. Some method of eliminating gravity must be used. The exercise may be given with the patient supine on a polished board, covered with talcum, or they may be given under water. Finally active reciprocal motion may be begun by the patient himself, when it has been demonstrated that it can be done without spasm. Gradually the amplitude of motion can be increased, and, much later, the speed increased. Rhythm must always be kept constant and should be equal in both directions. Passive stretching in spasticity is always entirely useless.

The indications for surgery should never be immediate.

4. Advanced treatment. The further treatment when relaxation and reciprocation have been established consists of combining motions which have been learned into active patterns. At first, it is wise to combine only two simple motions, such as hip and knee flexion, or bilateral

abduction-adduction of the legs, or elbow flexion with supination. As these combinations are learned, more combinations may be added. Motion under weight bearing gives rise to difficulties due to reflex stimulation of muscles by gravity. Thus, the motions of walking may be learned perfectly lying down and no change in the gait observed in walking. Here the gravitational effect has not been stimulated in the treatment. It can be thus stimulated in the treatment by making responses to motions while they are being learned and the results are gratifying. The best form of record of improvement is the motion picture record, taken at definite intervals. It is impossible to remember the performance from year to year, but a comparison of films will show the rate of gain, and act as a guide to further treatment.

Treatment of Epidemic Encephalitis. A review of the work of the Matheson Commission. Josephine B. Neal, M.D., and Inez Bentley, M.D., New York, in Arch. Neurol. and Psychiat., 28:4:897, October, 1932. (Read before the Association for Research in Nervous and Mental Diseases, December 28, 1931.)

METHODS OF TREATMENT

The more important of these measures may be listed as follows:

Methods for the destruction of the infecting agent.—These are:

A. Chemicals:
1. Acriflavine and other dyes,
2. Salicylates,
3. Iodine preparations,
4. Colloidal metals,
5. Arsenicals, including arsphenamine preparations,
6. Mercury derivatives, including mercurochrome 220-soluble.

B. Production of febrile reactions:
1. Numerous non-specific proteins,
2. Fixation abcess,
3. Malarial inoculations,
4. African recurrent fever,
5. Fever-producing baths.

C. Serums:
1. Convalescent serum,
2. Rosenow's encephalitis anti-streptococcic serum,
3. Gay's herpes hyperimmune rabbit serum.

D. Vaccines:
1. Levaditi's herpes recovered rabbit brain vaccine,
2. Gay's herpes hyperimmune rabbit brain vaccine,
3. Rosenow's vaccine for encephalitis,
4. Stewart's pfeiffer vaccine.

Methods for modifying the course of the disease by reducing intracranial pressure.—These consist in:
1. Hypertonic dextrose solution intravenously,
2. Hypertonic iodide solution intravenously,
3. Lumbar puncture.

Beneficial results have been obtained by all these methods in certain cases. The hypertonic dextrose solution certainly is valuable in building up depleted patients and improving the action of the heart as well as in decreasing intracranial pressure. The action of the iodides is not so definite.

Methods for the control of symptoms.—These include:

A. Drugs:
1. Duboisine, scopolamine, stramonium and atropine,
2. Bulbocapnine,
3. Ephedrine sulphate,
4. Sedatives, hypertonics and analgesics, phenobarbital, bromides, amytal, chloral hydrate, etc.

B. Endocrine therapy.

The various symptoms for which these drugs are used are too well known to require discussion.

Methods for building up general resistence, health and morale.—These consist in:

A. General hygenic measures, as diet, rest and proper elimination,

B. Removal of foci of infection,

C. Tonics:
1. Sodium cacodylate,
2. Iron preparations,
3. Strychnia,
4. Other tonics as indicated.

D. Physical therapy:
1. Hydrotherapy,
2. Electrotherapy including diathermy,
3. Roentgen treatment,
4. Massage,
5. Graduated exercises and reeducation of muscles.

E. Occupational therapy.

F. Psychotherapy.

General hygenic measures are of great importance at all stages of the disease, and especially during the acute stage. A prolonged period of complete rest is essential even in seemingly mild cases.

While we do not hold with those that believe that encephalitis is caused by toxins elaborated by focal infections, we do think that patients with encephalitis are adversely affected by these toxins and that it is therefore especially important that these focal infections be eradicated.

Sodium cacodylate is highly recommended, especially in the sub-acute and chronic stages of the disease. It is given in large doses either subcutaneously or intravenously.

Strychnia has been used with success in asthenic patients.

The value and methods of the more common forms of physical therapy are too well known to require comment. It may be noted that the improvement occasionally following roentgen treatment of the head was stated by Von Economo to be due probably to the vasodilatory effect of the irradiation and the subsequent hypernia of the atrophic basal ganglia. A similar effect may be produced by diathermy.

It is most important to combat by every possible means the discouragement that patients suffer from chronic epidemic encephalitis are bound to feel. To this end patients should be urged to interest themselves in suitable forms of occupation, in games and other methods of entertainment. Fatigue must always be avoided, but exercise within the limit of their capacity is essential.

Every effort should be made to encourage a spirit of optimism and courage, for the will to recover, or the lack of it plays no small part in the progress in most cases. This is a form of psychotherapy. In certain instances patients suffering from physical symptoms in a large measure due to mental complications have been improved by psychoanalysis or hypnosis.

Effect of Knee-Chest Position and Postural Exercises on Post-Partum Retroversion. Goodrich C. Schauffler,

M. D., Portland, Oregon, in Jour. A. M. A., 99:9:726, Aug. 27, 1932.

SELECTION OF CASES AND TYPE OF EXERCISES

Patients were numbered in the order of their delivery. Alternate patients (odd numbers) were put on a special regimen consisting of the ventral posture in bed, and the knee-chest position beginning on the eighth day post partum and increasing to twenty minutes twice a day. On the eighteenth day they were started on the camel walk, and instructed to rest as nearly as possible entirely on the abdomen while in the prone position. Conservative abdominal exercises in the upright posture were also prescribed. As far as possible, these procedures were supervised. Naturally, some patients were less faithful than others, but on the whole it would be difficult to obtain a better regulated and supervised group.

The even number patients were given no exercises whatever, and no instructions in regard to prone posture, and were directed not to undertake any such measures on their own initiative.

EFFECT ON KNEE-CHEST POSITION

The accompanying chart shows that the incidence of retroversion following the use of the knee-chest position has been 47.2 per cent as opposed to 34.5 per cent in the cases in which the knee-chest position was not used. There is room for a certain variation due to chance in as small a group of cases as this. However, there can be no question that the value of such exercises as described has been in the past vastly overestimated. Perhaps it is unfair to conclude from this series that the use of the knee-chest position actually increases the incidence of postpartum retroversion. On the other hand, the confidence that has always been placed in it as a therapeutic measure is no longer justified. It seems fair to conclude also that, since in this type of case postural exercises should be the most effective mechanically, owing to the heaviness and size of the corpus, the use of the knee-chest position in other types of retroversion would be even more futile.

If one chooses to put implicit confidence in these figures, then one must search for factors in the use of such exercises that might actually retard involution and favor retroversion. It is conceivable that the trauma due to early movement and disturbance of the pelvic structures with possible retardation of circulatory rehabilitation might act in such a way. It is quite possible that the natural forces of reconstruction may work better with the uterus in the vertical position, splinted by the sacral promontory, than under circumstances in which it is frequently teetered forward into an anterior position (perhaps unphysiologic at this time). As an analogy may be cited the potential harm in too early attempts to obtain complete flexion in an injured joint. These are merely speculations, but they may have some bearing on our rather surprising results.

The percentages that I have mentioned have been for the entire group of retroversions. It is of interest to note that the majority of retroversions have been second and third degree. This definitely establishes the fact that our observations are not influenced by a large group of borderline cases. If a large majority of these cases had been first degree retroversions there would be considerably more doubt as to the significance of our results. It will be noted in the chart that there is an incidence of 25 per cent of second degree retroversions following the use of the knee-chest position as opposed to 11.9 per cent in cases in which the knee-chest position has not been used. This discrepancy is even more marked than that in the total group. Since the second degree retroversion may be considered the average or the mean of the entire group, these comparative percentages lend some strength to the hypothesis that there may be factors in the use of the knee-chest position actually antagonistic to normal involution and ante-version.

SUMMARY AND CONCLUSIONS

1. Alternate patients (odd numbers) in a group of 169 deliveries were put on knee-chest position and postural exercises, whereas alternate patients (even numbers) were not given such measures.
2. Examination after six weeks revealed a substantially higher incidence of postpartum retroversions in the group subjected to the so-called corrective measures.
3. It is fair at least to conclude that the use of such exercises does not justify the confidence which has formerly been placed in them.
4. It seems wise even to seek for factors in the use of such exercises as may actually retard the tendency toward involution and return to the normal anterior position.

The Effect of Exercise on Human Erythrocytes. Christianna Smith, Ph.D., Associate Professor of Zoology, and Katharine F. Kumpf, M.A., South Hadley, Mass. (From the Walter H. Merriam Laboratory, Department of Zoology, Mount Holyoke College); in Am. J. Med. Sc., clxxxiv:4:537, October, 1932.

CONCLUSION

Two-minute periods of strenuous exercise produced a transient increase in the total number of red corpuscles per cubic millimeter in the peripheral blood stream.

This short but severe exertion failed to alter significantly the total amount of hemoglobin or the volume percentage of erythrocytes.

A drop occurred in the estimated mean corpuscular volume and mean corpuscular hemoglobin immediately after exercise, suggesting that cells were present smaller in size and containing less hemoglobin than those normally circulating in the capillary beds on the body surface.

The smaller amount of hemoglobin was correlated with the decreased volume of corpuscles, so that the proportion of hemoglobin to other corpuscular contents remained relatively constant during rest and exercise.

Chronic Arthritis in Children. Abst. in Jour. A. M. A., 99:7:590, Aug. 13, 1932, from Am. J. Dis. Child., Chicago, 43:1118, (May) 1932—Part I.

Kuhns and Swaim call attention to the fact that disturbances in growth are not uncommon in chronic arthritis in children. Such disturbances may appear only after several years of the disease and are found oftenest in children with poor health and resistance. These disturbances, while they are influenced by nonuse of the body and by nutritional and endrocrine dysfunction, are due chiefly to the involvement of the proliferating epiphyseal cartilages, resulting in early ossification. They are dependent on the severity and chance location of the arthritis. There are three general types of disturbances in growth in chronic arthritis. The commonest of these is the persistence of infantile proportions in the hands and feet. Shortness of an extremity or a portion of an extremity, or symmetrical shortening of two limbs, is fairly common. Dwarfism is relatively rare but occurs in cases of severe generalized arthritic involvement. The prevention and cure of these disturbances rest, first, on general measures to combat the disease in its early stage and to improve the general condition of the patient as rapidly as possible, and, secondly, on local measures to improve the function of the extremities and to promote

circulation. The authors believe that every child with chronic arthritis should be observed at regular intervals for at least five years after the disease is quiescent.

Traumatic Arthritis. In Arch. of Surg., 25:3:614, September, 1932.

Key enumerated the various types of chronic traumatic arthritis. Acute traumatic synovitis was not considered except incidentally in the discussion. Traumatic arthritis might follow; (1) a single severe injury to the articular cartilage, (2) repeated mild injuries, (3) disorganization of the joint mechanics and (4) bony deformity. Typical cases of each causative factor were discussed. Certain cases could be prevented. Medical treatment was of value only in that it affected the patient's general health and reparative powers. Physical therapy was of value and the greatest physical therapeutic aid was rest. Manipulation should be used with caution if at all. Surgical measures were indicated for correction of bad alinement (osteotomy), removal of foreign bodies, fusion (of certain joints only) and, in extreme cases, of arthroplasty.

Hydrotherapy in the Treatment of Arthritis. Maurice F. Lautman, M. D., Director, Department for the Study of Arthritis, Leo. N. Levi Memorial Hospital, Hot Springs, in J. Arkansas M. Soc., XXIX:4:94, September, 1932.

The drug treatment of arthritis has, quite correctly, been relegated to the discard, thus limiting the therapeutic approach of the physician treating arthritis patients, to three broad lines of attack.

1. Locating and eradicating every possible source of infection, and building up the patient's physical resistance.
2. Massage and physiotherapy.
3. Hydrotherapy.

By hydrotherapy is meant the art of applying water in the treatment of disease. It implies the internal as well as the external use of water, whereas the term balneotherapy is more correctly reserved for the external application of water at varying temperatures and modalities. Hydrotherapy is one of the most ancient arts in medicine, and while formerly it was used largely upon an empirical basis, efforts are continually being made, with a great measure of success, to reduce it to a science.

In arthritis, the proper application of hot water in its various modalities, can be made to exert a variety of reactions which might be classed as local, mechanical and constitutional. Locally, by means of hot packs, hot sprays and hot douches, there is produced a state of hyperemia and muscular relaxation with consequent relief from pain.

Furthermore, the vascular dilatation aids in the resorption and removal of unorganized inflammatory deposits, and also promotes circulation in the capillaries. Pemberton has established the fact that the primary pathological change in an arthritic joint is due to interference with the capillary circulation. The value of increased capillary circulation in these cases is, therefore, obvious.

Body Temperature.—It was found that there was a rise in each patient's temperature of from one to two degrees Fahrenheit, following ten minutes immersion in water at 98 degrees Fahrenheit. An additional rise of one to two degrees occurred after three minutes in the vapor cabinet. Ten minutes in the hot packs produced no additional rise in temperature. The patient's temperatures, which ranged from 100 degrees to 102 degrees after completion of the bath, gradually returned to 98.6 degrees in three to five hours.

Leucocyte and Differential Count. In all cases there was found, after the bath, a five to fifteen per cent increase in the total white cell count, with a five to ten per cent increase in the polymorphonuclear variety.

Plasma Volume. The plasma volume remained constant during the bath, the relation of plasma to the solid elements of the blood being maintained by giving the patients sufficient water to drink to avoid dehydration by perspiration. For this reason, the leucocytosis could be regarded as absolute rather than relative, that is, there was an actual increase in the white blood cells, rather than a concentration of the cellular elements of the blood due to dehydration.

Phagocytic Index. It was found in most patients that the phagocytic power of the blood was increased following the bath. Before the bath the average number of bacteria ingested by 100 leucocytes was about 300, whereas after the bath 100 leucocytes would ingest close to 600 bacteria.

COMMENT

It will be seen from the foregoing that hydrotherapy is of great service in the treatment of almost all forms of subacute and chronic arthritis, as well as many of the rheumatoid disorders, for the following purposes.

1. For stimulating the immunizing mechanism and for aiding the absorption of inflammatory products. Its action resembles to some extent that of protein shock.
2. For stimulating capillary circulation in affected joints and for promoting elimination through the skin (diaphoresis) and through the kidneys (diuresis).
3. For the relief of pain.
4. For aiding (by the relief of muscle spasm and by obviating gravity) the re-education of function in joints and muscles stiffened or deformed by previous inflammation.

Manipulation of the Stiff Shoulder. J. D. Ellis, M. D., in Illinois Med. Journal, lxii:2:121, August 1932.

X-ray examination of the examined shoulder must not be omitted since the diagnosis of early tuberculosis and bone malignancies which must not be manipulated often rests upon roentgenological evidence. However, King and Holmes, who studied roentgenologically 350 painful and stiff shoulders, excluding cases of fracture and dislocation, found that only fifty of these or 14.3 per cent presented x-ray evidence of bone or joint pathology. They concluded that the differential diagnosis of arthritis, bursitis, tendon and periarticular lesions must frequently be based on clinical examination. Loose bodies in the joint or subacromial burse visualized in the roentgenogram certainly cannot expect to become symptomless after manipulation. A tendency to myositis ossificans extending along muscle and fascial planes contraindicates any forcible treatment.

Conditions where manipulation is indicated.—We are assuming that the case comes to the surgeon after the acuity of whatever etiology has subsided and restricted motion is a long established condition whether or not all or only particular movements are persistently painful. An attempt to diagnose the residual pathology aids in determining the prospects of successful manipulation and the degree of caution with which this should be undertaken. For this purpose four groups of cases may be distinguished:

1. The frankly post-traumatic;
2. "Periarticular" conditions where trauma plays a role of varying importance;
3. Post-rheumatic conditions;
4. Osteoarthritis.

Technique of graded manipulation.—By manipulation

of the shoulder joint followed by maintenance of the joint in a position of rest and muscle balance, the following physiological results are obtained:

Relief of muscular spasm by the new position;

Increased circulation in periarticular structures;

Increased absorption of exudates for bursae and the joint by—

Breaking up intra-articular and intra-bursal bands and pockets.

Preliminary preparation or treatment can be divided into remote and immediate. By the first is meant a thorough course of baking and massage to promote circulation and relieve edema and fibrosis as much as possible by this conservative treatment. This procedure leaves the examiner able to ascertain exactly which movements are persistently painful and restricted. He should make written notes of the exact degree of passive and active abduction, internal and external rotation possible at this time to check with his findings as to movements when the patient is anesthetized for manipulation. This conservative treatment should be continued until no further progression in improvement occurs.

Immediate preparation consists of the application of hot moist dressings with the shoulder in the greatest possible abduction the patient can endure for four to six hours.

At the first manipulation under gas (preferably ethylene) only one motion can be attempted. When the operator who has slowly attained a slight improvement of motion by weeks of baking and massage, finds he can accomplish all movements by force, after the patient is anesthetized, he sometimes feels an almost irresistible impulse to pump the arm up and down and rotate it forcibly in all directions until passive motion is complete. This is often possible but has calamitous results. A more complete spasm ensues, ruptured fibrinous adhesions are replaced by fibrous bands and the loss of function is greater than before the treatment. Kneading of the structures which feel tense should accompany the manipulations. When spasm in the muscle still persists, if the part is held immobile and "on the stretch" for two or three minutes, the spasm will quite surprisingly relax and further motion can be accomplished.

The only motion attempted at the first maneuver should be abduction and this by a "coaxing" motion and only until one notable tearing of shortened structures is felt or heard. This snap which the osteopath calls "reduction of a subluxation" may be due to a stretching of a folded joint plica, release of a fibrous shortened tendon or ligament or tearing of an intra-articular or bursal band. Stop here and apply hot dressings with the hand tied to the head of the bed, securing maintenance of the maximum abduction obtained.

A commonly overlooked principle underlying the efficacy of this treatment lies in the fact that the joint is endowed with remarkable power of repair and that these powers are often proportional to the motion permitted in the joint; that they depend on function rather than on rest of the part. A striking characteristic of various types of chronic arthritis, traumatic or otherwise, is the observation that stiffness is aggravated by rest and becomes less marked after exercise and use of the affected extremity provided such use is not excessive. On awakening in the morning the stiffness is greater than it is later in the day after even minimal use. If manipulation has been properly performed one rarely finds the patient complaining of spontaneous pain on the morning following the maneuver. Nevertheless, hot fomentations are again applied.

In two or three days if abduction is not complete, finish it under anesthesia. During each manipulation the scapula must be grasped firmly with the left hand to prevent scapulo-thoracic movement which might deceive the operator expecting to establsh scapulo-humeral abduction. After another waiting period, secure complete external rotation in one or two stages. At the last step, complete internal rotation once forcibly but put up the arm thereafter in an airplane splint and allow the patient to leave the hospital wearing this with the arm in abduction of 90 degrees or a little more and complete external rotation.

Physical treatment must follow this manipulative series for several weeks, at each seance the splint being removed and abductions and rotations being performed after baking and massage. In the author's experience, the motions of extension (or retraction) and flexion (or protraction) will be secured without special manipulation or after treatment if complete rotation and abduction are reestablished.

The Treatment of Fractures in the Light of Their Ischaemic Complications. G. R. Girdlestone, F. R. C. S., Oxford, Eng.; Jour. Bone & Joint Surg., xiv:4:755, October, 1932.

Presented at the annual meeting of the American Orthopedic Association, Toronto, June 17, 1932.

TREATMENT

1. Patience. The gardener does not dig up his plants to see how their roots are doing! Even manual examination may damage the delicate young vascular connections, and premature operations are not only worthless, but tire the patient and add further trauma. I suggest that the persistence of ischaemia in cases such as have been described implies a dysfunction of the local sympathetic system and that operations aggravate this dysfunction, in addition to deferring the corrective influence of natural function.

2. Continuous, accurate immobilization without constriction. This should interfere as little as possible with the movement and function of the neighboring parts. Lateral mobility must be avoided for it stimulates the fibroblasts in the neighborhood, and the fibroblasts in these cases have a dangerous majority over the osteocytes on account of the absence of any contribution of cells from the fragments; or if one speaks in the fashion of the moment, of the region as populated by histiocytes, lateral movement tends to make them behave like fibroblasts rather than histioblasts, producing fibrous tissue around bone.

3. The third remedy is function—of the whole limb and of the bone itself.

a. Activity, sensory and motor, of as much of the limb as possible, directed toward the initiation of afferent, sympathetic impulses, and thus toward active hyperemia through the local and ganglionic reflex arcs. This active hyperemia is a physiological response to stimuli of a physiological order.

b. Function of the bone itself, e. g., either in the active form (weight bearing), or in the passive form, in which vibration is applied by a hammer (H. O. Thomas), or by a vibro-massage machine, for vibration is the natural stimulus which makes bone cells work.

In addition, there is much clinical and experimental proof of the value of periodic mild, venous congestion though continuous venous congestion appears to delay or check psteogenesis.

The moral of my story is that, in dealing with any and every fracture, we should remember the vital importance of the circulation. In reduction any disentanglement should be carried out with the vascular anatomy

in mind, and when axial extension is advisable the pull should be increased gradually to avoid strangulation. After reduction we have to solve this problem: How to maintain accurately the position of the fragments without any constriction of the circulation, but with the splintage so well fitted that there is a minimum of interference with the function of the limb. It is an old saying in the trade that we must make the limb fit the splint, in the sense that the splint must be the master. But we can only do so rightly and safely if we begin by making the splint fit the limb as we wish it to be. Then the hold need not be extensive, the hand can be freely used, the foot given movement or weight bearing. Function should be reasonably easy and not uncomfortable. The uninjured parts of the limb can hardly be used too soon, but the injured parts need a period of repose. From all the tissues used comfortably and naturally will arise afferent impulses promoting hyperemia, and there will be transferred to the bone stimuli of the order which will activate rather than overload the osteoblasts. For we know that, ceteris paribus, function and blood supply balance, there is a local control of circulation, partly through ganglionic, and partly through forked nerve axon, reflexes; and we know that bone cells can build or unbuild, changes of environment provoke characteristic response from cells whose hereditary and life long craft has been the care of bone. It is for us to see that the cells are stimulated toward osteogenic activity, and that the activity is maintained by circulation which is generous in quantity and in quality.

New Physical Therapy of Circulatory Disturbances. Abst. in Jour. A. M. A., 99:6:517, Aug. 6, 1932, from Wiener klinische Wochenschrift, Vienna, 45:591, May 6, 1932.

In the introduction, Eisenmenger discusses the motive powers of the circulation; namely, the cardiac pressure, the activity of the capillaries, the intrathoracic negative pressure and the intro-abdominal positive pressure. He then relates that he was able to influence circulatory disorders by producing supra-abdominal air pressure fluctuations. He employs a suction and pressure air pump that acts by way of the flexible abdominal walls and the soft abdominal organs on the diaphragm and through this on the lungs and heart. He illustrates the efficacy of this treatment by five case reports. The treatment is employed for from five to fifteen minutes at a time. During the first two or three minutes the pressure changes are made more rapidly, namely, from twenty to twenty-two times, but then the frequency is reduced to from twelve to sixteen times. The intensity of the pressure, however, is at first weak and later stronger. In the last part of the article the author discusses the influence of the pressure changes on the venous system, the two auricles, the pulmonary circulation, the aorta, the splanchnic region, the liver and the other thoracic and abdominal organs.

Modern Muscle Physiology and Circulatory Failure. J. C. Meakins, M. D., C. M., LL.D., F. R. C. P., F. A. C. P., Montreal, Canada, in Ann. Int. Med., vi:4:506, October, 1932.

The prevailing interpretation of circulatory failure, particularly when conceived as cardiac in origin, is usually founded upon an anatomical concept, the reason most probably being that the special senses are appealed to. The murmurs produced by valvular defects are readily heard or felt. The irregularities of rhythm are likewise recognizable either by palpation of the pulse or by graphic records such as the electro-cardiograph. The rest of the disorders or deficiencies of function are covered by that all-embracing term, myocarditis. What this actually means is hard to define and the term has probably done more to retard our investigation of circulatory disease than any other single factor. The cardiac muscle, the very mainspring of the circulatory system, has received but scant attention. It is a fact that whereas twenty years ago the stethoscope was the last court of appeal in cardiac diagnosis, now the electro-cardiograph is the main arbiter. But no matter how meticulously the QRS and T deflections are studied the knowledge so obtained is but limited and what is worse it becomes almost Delphic in its oracular dogmatism, platitude being piled upon platitude. Unless we continue to seek the complete truth of why cardiac muscle fails, the full understanding of circulatory disease can progress but little.

There is probably no realm of physiology that has attracted more attention during the past twenty years than has the elucidation of muscle contraction. The search for truth has been pursued with a single-mindedness of purpose, a generosity in controversy, and an open acknowledgment of mistakes that is seldom seen in scientific disputes but which is much to be emulated. This knowledge must now be applied to the pathological physiology of the heart. This is not the place to enter into a detailed description of the most modern conception of muscle physiology, but a brief account is neccesary.

Physiologic Effects of High Frequency Current. Abst. in Jour. A. M. A., 99:9:785, Aug. 27, 1932, from Am. J. Physiol., 101:194, June, 1932.

Nasset presents experimental data showing that, in hyperthermia produced by high frequency electric current, the blood was concentrated 40 per cent or more. Below a body temperature of 41 C. (105.8 F.) the hemoglobin saturation of the venous blood was increased; above this temperature it was diminished. The loss of water from the blood stream was accompanied, and probably partially compensated for, by a large storage of corpuscles in the spleen. The carbon dioxide content of venous blood was reduced as much as 30 per cent. The alkali reserve, as measured by carbon dioxide capacity, was decreased but to a lesser extent than the carbon dioxide content. It is suggested that this disturbance in the acid base relations of the blood is a consequence of three factors: namely, hyperthermia, hyperventilation and a greatly accelerated metabolic rate.

Physiological Effects of Diathermy Currents. Claude Saberton, M. D., in Diathermy in Medical and Surgical Practice, page 31 (Cassell & Co., Ltd., London, New York, Toronto and Melbourne, 1920).

The artificial general pyrexia resulting from diathermy treatment differs from ordinary pyrexia in that it is not produced by toxins circulating in the blood. After cessation of the treatment, the heat regulating mechanism quickly eliminates the excess of heat, and the temperature returns to normal. Certain tissues, however, such as the bones of the wrist joint, which readily become heated in hand to hand diathermy, retain their heat for a considerable time, and only give it up slowly to the circulating fluids of the body.

A Clinical Study of Artificial Hyperthermia Induced by High Frequency Currents. Francis W. Bishop, Associate in Medicine (Radiology), Charles B. Horton, M. D., Instructor in Medicine (Psychiatry) and Stafford L. Warren, M. D., Associate Professor of Medicine (Radiology) with the technical assistance of Miss Emmy Lehman, R. N., Rochester, New York; in The Am. J. Med. Sc., clxxxiv:4:515, October, 1932. (From the

Divisions of Radiology and Psychiatry of the Department of Medicine of the University of Rochester, School of Medicine and Dentistry, and the Strong Memorial Hospital.)

Method.—In order to eliminate the use of blankets, which are cumbersome and give the patient a sense of restraint, a cellotex chamber was built, which covers the patient and prevents loss of heat. The upper portion is shaped like half an octagon. The lower half consists of a box containing a mattress, into which the upper half fits snugly, to prevent leakage of heat. At one end a semicircle is cut to allow the patient's head to remain outside of this chamber. There are five carbon filament lamps in the foot end of the box and three at the head end. These are controlled from the outside and maintain the air temperature within the box at a level sufficiently high to compensate for loss of heat by the patient through radiation, etc. (usually around 45 degrees C.). Drapes surround the patient's neck to prevent leakage of air in this direction. Various apertures for the recording rectal thermometer, electro-cardiograph leads, etc., are present.

The patient is placed on the mattress and block tin electrodes 28 x 46 to 60 cm., are bound on the anterior and posterior surfaces of the trunk by means of many tailed surgical binder. The patient is then covered by a sheet. The electrodes are connected to the high frequency machine. The lights within the cabinet are turned on and the rectal thermometer inserted. The pulse and respiration as well as the temperature, are recorded every ten minutes.

The high frequency apparatus is a slightly modified "diathermy" machine able to pass 5,000 to 6,000 milliamperes through the patient's trunk between the block tin electrodes.

Preliminary Clinical Results.—The first patients treated were chosen from a group of badly disoriented and degenerated paretics. Some of these were in very bad physical condition. Two who were especially disintegrated, and who had been in bad physical condition for many months, were given artificial fever and tryparsmid, but they continued to go down hill and died several months after the fever treatment. The rest have shown great clinical and psychic improvement and gains in weight of from 20 to 30 pounds. All have been paroled, and of the fourteen only one has relapsed, but this patient has had only one treatment of a five-hour fever. The remainder have had from two to four treatments at intervals of from ten days to several months apart. The chemical changes have been consistent and resemble the changes after malarial therapy. The gold sol, curves, the protein and the number of cells in the spinal fluid returned to the normal. The Wasserman reactions in the spinal fluid and blood have changed somewhat but have not yet become negative. The shortest period between treatment and parole was five months, the longest, nine months.

The next series treated was an arthritic group. In this group those who responded most were patients suffering with arthritis of gonorrhoeal origin. The acute lesions subsided rapidly, lost their redness and tenderness, and there was gradual recovery from the stiffness. The chronic lesions became painless and there was gradual relief from the stiffness with increased mobility. Two treatments were given from ten days to a month apart. The effectiveness of the five-hour fever period in gonorrhoeal infection is supported by water bath experiments on the thermal death time of gonorrhoeal cultures, the results of which will be reported elsewhere. A series of patients with chronic infectious arthritis with soft tissue proliferations and bone atrophy or with bone destruction was treated next. Immediate relief from pain occurred and in some patients joint pain had not returned within a period of eight months. There has been increased mobility and a reduction in the size of the soft tissue swelling. As the patients have used their joints more, some of them have been troubled with muscle pains. The usual rehabilatory measures are of course necessary after the fever treatment. It is too early to speak of the permanent results in arthritis at this time. This will be reported elsewhere at a later date.

Gonorrhoeal vaginitis and cervicitis in adults has been cleared up in from one to two treatments with no evidence of infection by culture or smear after the next menstrual period following treatment. These cases have all been resistant to the usual forms of therapy. Other disease entities have also been treated but the number has been few and the time too short to draw any conclusions from these cases. We wish to emphasize that the above treatments are tentative and are based upon periods of observation of relatively short duration, the longest that the patients have been under observation being only one and one-half years. It can be stated definitely that immediate clinical improvement in the paretic group, certain types of the arthritic group, and the group having gonorrhoeal infections is very encouraging. How lasting these results will be can only be determined by observations over a longer period of time.

SUMMARY

Artificial hyperthermia can be carefully and accurately controlled by a rather standardized procedure well within the scope of the average hospital. The whole body temperature is elevated by the passage of high frequency currents through the trunk by means of large block tin electrodes. The temperature is maintained at any desired level below 42 degrees C for five hours without danger to the patient in ordinary physical condition. This is accomplished by keeping the patient surorunded by air at a temperature sufficiently high to compensate for losses by radiation, etc. The temperature can be lowered at will by cooling the patient's environment, by cool drinks and, most important, by a cold enema. The condition of the patient is determined by temperature, pulse and respiration readings taken every ten minutes, by blood pressure determinations at frequent intervals, and by noting the color of the skin. The fluid balance should be maintained. Excitement is avoided by proper sedatives and calmness on the part of the personnel.

One hundred treatments have been given to fifty-seven patients in nineteen months, with a mortality of two per cent, based on one hundred treatments; if based on the number of patients then the mortality is 3.5 per cent.

A careful selection of patients should be made until sufficient experience with the method of treatment by artificial hyperthermia has been acquired to evaluate the possibility of damage to the patients in poor condition.

Artificial Fever Produced by the Short Wave Radio and Its Therapeutic Application. C. F. Tenney, M. D., F. A. C. P., New York, N. Y., in Ann. Int. Med., vi:4: 457, October, 1932.

SUMMARY

We have been very much encouraged in our work with the high frequency heater as an aid in treatment. Arthritis has become such an economic problem that any aid in the care of this disease is of great value. We think as Dr. Ralph Pemberton does, that arthritis is in part a disease of the circulation and that any one of several infective agents may be the causative factor in many of the cases. Heat in almost any form is excellent. If

the patient is undergoing a course of vaccine therapy under the direction of his physician and is referred to us for radiothermy, the vaccine is continued. The greater number of our cases have been treated with radiothermy and massage, with the preliminary step of removal of foci of infection.

In our use of the high frequency heater in the treatment of syphilis, we have treated primary, secondary and tertiary cases in conjunction with the regular antiluetic treatments. The results of the treatment in the primary and secondary cases have been good; the primary lesion and secondary rash disappeared with unusual rapidity. In some of the cases whose Wassermann reaction was strongly positive, after one treatment the reaction has been returned as weakly positive. Our best results have been obtained in the tertiary cases, especially in those involving the central nervous system.

Dr. Hinsie's observations in 136 patients with general paralysis, one-half of whom had malarial treatment and the other half radiothermy treatments, showed that the clinical signs of improvement have been equal in both. The laboratory findings, however, do not show signs of improvement as rapidly in radiothermy treated cases as in the malarial. The explanation of this is that it takes longer for laboratory findings to change than it does for clinical manifestations.

If a temperature of 106 degrees is maintained from two to four hours in cases of gonorrhoeal infection, such as urethritis, and pelvic inflammatory disease, it acts almost as a specific. As the thermal death point of the gonococci is supposed to be around 104 degrees, they are probably destroyed by the heat.

In diseases of the circulation of the lower extremities we have used both the general and local forms of therapy. In the few cases of intermittent claudication of the arteriosclerotic type we have treated there is improvement; pain comes on later in exercise, and there is an increase in the arc of the oscillometer readings. In thrombo-angiitis obliterans in younger individuals we have not had sufficient time nor cases to draw definite conclusions. In three cases of Raynaud's disease treated, the results compare favorably with those of foreign protein injections.

Conclusions

We feel that we are using a form of artificial fever which is less hazardous than that produced by intravenous injections, and these conclusions have been reached after giving over one thousand treatments.

It is a form of fever which is entirely within the control of the operator, if kept below 107 degrees.

There is very little discomfort to the patient.

Application is simple.

We believe that this method of producing artificial fever is superior to other methods, and that the therapeutic results are better.

The Treatment of Gonococcal Infections by Artificial Hyperthermia. A Preliminary Report. Stafford L. Warren, M. D., and Karl L. Wilson, M. D., Rochester, N. Y., in Am. J. Obst. & Gynec., xxiv:4:592, October, 1932.

(Read at the 57th annual meeting of the American Gynecological Society, May 30, 1932, at Quebec, Canada.) (From the Department of Medicine, Division of Radiology and the Department of Obstetrics and Gynecology, University of Rochester.)

Technic of Procedure.—As at present carried out, preliminary sedatives are given, and these must be carefully chosen. We have found it most satisfactory to administer sodium bromide 2 gm. and barbital 0.650 gm. two hours before the treatment is begun. Chloral hydrate 0.486 gm. is given by mouth at the beginning of the treatment, and this latter may be repeated three hours later. Following this medication the patients usually rest or sleep quietly during the period of hyperthermia. During the treatment the patient is encouraged to drink water freely while awake.

The patient is placed lying on a cot in a well insulated cabinet, the head being allowed to remain outside. The temperature of the air in the cabinet surrounding the patient's body is heated by means of several carbon filament lamps totalling about 650 watts. The body temperature is raised by passing diathermy current through the thorax between block tin electrodes held in place by a many-tailed binder. The elevation of the body temperature by the short-wave (30 meters) radiothermy apparatus is equally efficient. After the desired temperature level has been attained (41.5) as indicated by a rectal thermometer, and which will require an hour and three quarters, the current is shut off and the electrodes removed. The body temperature can then be easily and accurately maintained by means of the light bulbs in the cabinet, turning them on or off as indicated. With a well-insulated cabinet, heat loss from evaporation of sweat is minimal, and may be further reduced by increasing the humidity of the air in the cabinet by placing an open vessel of water in it.

After the patient has been subjected to high temperature for the desired length of time, usually five hours, the lights are shut off, the cabinet opened, and the patient's body exposed to the room air. The resulting fall in temperature may be expedited by exposing the patient's body to a stream of air from an electric fan. So long as the skin temperature does not fall three degrees C below the general body temperature, no discomfort is experienced. One to one and a half hours will be required for restoration of normal temperature, depending on the obesity of the patient.

Summary and Conclusion

The results obtained in twenty women who presented various forms of infection and who were treated by general hyperthermia are herewith presented. The results on the whole have been satisfactory and generally resulted in a rapid disappearance of symptoms as well as disappearance of the organisms. The failures in this series have been due to either deficient treatment, or to the fact that the particular strain of gonococcus encountered was more resistant to heat than the average strain of organism is. A point we would emphasize is that even in failures we have at no time observed any evidence which would point to an exacerbation of the condition present, but rather the reverse held true.

This series is much too small to permit of any far reaching conclusions being drawn, and we do not recommend this procedure at present as a routine procedure in the treatment of gonorrhoeal infections. Rather, we present this preliminary report as a clinical demonstration of the fact, established in the laboratory, that the usual strain of gonococci can apparently be destroyed in the body after exposure to high temperature for definite lengths of time. For clinical application the temperature and duration of therapy must be such as to be safely tolerated by the patient.

Encouraged by the results obtained in this small series, we propose to continue this work and hope to develop a technic which will be simpler and more easily tolerated by the patient. Further observations should also permit us to decide more accurately the type of pelvic lesion and the stage of the disease which will be most

amenable to this form of therapy. No doubt some women will be found to be infected with strains of organisms which are usually resistant to heat and in whom, therefore, this line of therapy will prove to be impracticable.

Phototherapy in Erysipelas. Abst. in Jour. A. M. A., 99:9:788, August 27, 1932, from Brit. Med. Jour., London, 1:929 (May 21), 1932.

Davidson presents a report on fifty-one cases of erysipelas treated by exposure to an artificial source of ultraviolet radiation, the exposure being from one and a half times to twice that required to produce a definite erythema on normal skin. The treatment of erysipelas, particularly the early case, by ultraviolet radiation appeared to give better results than other methods in use. The method is easily applied, usually available, devoid of danger, clean and inexpensive. The technic is simple and can be carried out with any ultraviolet lamp of known efficiency. Before treatment is begun, any soothing preparation previously applied to the part, especially if greasy, is carefully removed from the affected area and surrounding skin. All patients, except infants, are exposed for five minutes with the arc at a fixed distance of 12 inches (30 cm.). In the case of infants a slightly shorter exposure is employed, when the actual individual erythema dose is not estimated. In all cases part or all of the inflamed area, according to its extent, is included in the exposure, with a margin of about 1½ inches (3.8 cm.) of healthy skin when this is possible, the rest being protected by some light covering. In facial and head cases generally, the eyeballs are protected by small pads of absorbent cotton fixed by a narrow strip of adhesive plaster, but the eyebrows are left uncovered, and each part of the spreading edge is systematically exposed to rays falling, as far as possible, perpendicularly. When the entire involved area is easily covered by one exposure this completes the treatment, but occasionally part of the lesion, which at the time of admission is assumed to have subsided, is neglected and has to be treated later. In the few cases in which definite extension occurs through the erythematous area, the treatment is repeated one or two days later if a margin of healthy skin can still be included. Following the irradiation, the affected part is left uncovered, or at least without dressings, except when pain is a prominent feature, and in these lint wrung out in cold water and frequently renewed is sufficient. All other treatment is symptomatic.

Physical Therapy in Dermatology: A Brief General Outline. Chairman's Address, George M. MacKee, M. D., New York, in Jour. A. M. A., 99:7:521, August 13, 1932.

Ultraviolet Rays.—It appears to be the general impression that ultraviolet irradiation is of great value in dermatology. This opinion is based largely on the clinical observations of those who are not dermatologists. Even in dermatology much of the knowledge of the effect of this agent on the various dermatoses is based on the clinical use of heterogeneous radiation without suitable controls. The possibility of spontaneous recovery, coincidence and the effect of air, temperature and visible light have not always been duly considered. There is evidence sufficient to justify the statement that ultraviolet radiation is of value in erysipelas and certain types of cutaneous tuberculosis. It is reasonably well established that ultraviolet rays are useful in adenoma sebaceum and for selected cases of acne vulgaris, pityriasis rosea, psoriasis, telangiectasia and indolent ulcers. There is a difference of opinion relative to the value of ultraviolet radiation in about thirty other dermatoses for which this agent is claimed by some to be therapeutically useful. While admitting occasional good results that appear to be due to ultraviolet radiation, the majority of dermatologists do not consider it to be an important agent in the management of these disorders.

Heat.—Heat therapy is quite widely employed in dermatology by means of conduction, convection, radiation and high-frequency electricity. Originally, heat therapy consisted of the application of heat by hot objects, such as a poultice and hot water. In recent years, radiant heaters have been popular as a source of infrared radiation. At the moment, medical diathermy is the most popular method of applying heat therapy. In this form of heat therapy, the heat is generated in the tissue instead of being applied to the tissue.

Cold.—Freezing the skin with ethyl chloride or solid carbon dioxide is successful in some cases of larva migrans. The same method has been used for scabies and dermatophytosis with poor results. Cold compresses are used occasionally to provoke cutaneous reaction in the congested skin in certain chronic dermatoses. Ethyl chloride and solid carbon dioxide is not now so popular as in former years, but it is useful for the destruction of warts, certain nevi and discoid lupus erythematosus. It is now possible to obtain hard blocks of solid carbon dioxide from the confectioner, who uses it for ice cream cartons.

Electrolysis is a valuable therapeutic method, and should be more universally employed. It is useful for the removal of many small benign lesions, and it is the best available method for the permanent removal of superfluous hair. Dermatologists have neglected this aspect of physical therapy, with the result that many patients are compelled to go to cosmetologists and beauty specialists. Instruction in electrolysis should be included in the curriculum of post-graduate courses in clinical dermatology.

Massage, Posture, Etc.—It seems to be the consensus that massage is useful for scleroderma. It appears to be of some value in cases of hyperplastic scar tissue and perhaps for some of the chronic dermatoses. It is used for various types of alopecia.

Rest in the reclining position is necessary for some acute generalized eruptions. Elevation of congested extremities, the wearing of elastic stockings, prescribed exercise and rest and strapping are of value in cases of dermatitis hemostatica and indolent ulcers. Balneotherapy consisting of baths of various kinds, including the permanent bath for pemphigus, is used by nearly all dermatologists. In fact, if balneotherapy includes wet dressings and compresses and water as a vehicle for the application of heat, cold and various chemicals, it is indeed a widely used method.

Surgical diathermy is the application of a high-frequency current for the purpose of destroying tissue. In dermatology there are three types of high-frequency currents that are used for this purpose. The cutting current is obtained from the primary winding of the high-frequency transformer or inductance. This may be monopolar or bipolar, depending on the construction of the apparatus and the number of turns of the primary winding in the current. It may be damped or undamped. The voltage is low as compared with the other currents. The current cuts like a knife, and there is sufficient coagulation of tissue to seal the lymphatics and the small blood vessels. The electrode is usually a needle or a fine wire loop.

The coagulating current is obtained from the same

source and it, too, may be monopolar or bipolar. The active electrode is usually a small needle. This current coagulates tissue to a distance of several or many millimeters in all directions from the needle electrode.

The desiccating current is monopolar and is obtained from the secondary of the high frequency transformer. This was formerly called the resonator or Oudin current, and its application was known as fulguration. The current has a comparatively high voltage and low milliamperage. This current dehydrates, desiccates or nummifies the tissue.

The various forms of surgical diathermy are employed for a variety of cutaneous conditions. With the desiccating current it is possible to dehydrate accurately a tiny lesion of the skin or to destroy a large superficial lesion. Electrodesiccation is used mostly for the destruction of certain nevi, warts, small areas of leukoplakia and many small, superficial benign lesions. Electrocoagulation is used mostly for the destruction of malignant neoplasms. The cutting current is employed to excise both benign and malignant new growths either alone or combined with electrocoagulation, radium and roentgen rays. It is also used with a loop electrode to remove the elevated portion of a large, thick keloid, after which roentgen rays are applied to prevent a recurrence. In selected cases of malignant neoplasms surgical diathermy appears to be superior to scalpal surgery because it seals the lymphatics and blood vessels and because it can be used in locations inaccessible to the scalpel.

A Convenient Source of Wood's Light for the Diagnosis of Ringworm of the Scalp. By A. M. Davidson, M. B., Ch. B. (Edin.), M. D., Lecturer in Dermatology, University of Manitoba, and P. H. Gregory, Ph. D. (Lond.), Research Worker on Dermatophytes, University of Manitoba, Winnipeg, Can. M. A. Jour. xxvii: 2:176, August, 1932.

In 1925 Margarot and Deveze discovered that hairs infected with fungi belonging to the genus Microsporon, when examined in the dark with ultraviolet light, fluoresce with a green light which is quite distinct from the fluorescent colour of the normal hair and skin. A similar fluorescence was observed in hairs from cases of favus. Since the original communication by these observers, the test of fluorescence in the so-called "Wood's light" has been more or less widely applied in the diagnosis of ringworm of the scalp. Undoubtedly the best source of ultraviolet rays for the purpose consists of a water-cooled quartz mercury-arc lamp, fitted with Wood's glass or some other filter capable of absorbing most of the visible light but transmitting the longer ultraviolet rays. This apparatus has several limitations, and a need has been felt for an inexpensive, light, portable lamp that can be plugged into any lighting circuit. Such a lamp has been produced after tests of several types of filter and sources of light. No claim to perfection is made for the design of the lamp, and, no doubt, one can be made both smaller and lighter than that described below.

The light source employed consists of a Mazda "Photoflood" lamp. This is a high intensity lamp designed primarily for photographic work, and having a life at 115 volts of about two hours. The price is similar to that of an ordinary electric bulb. Tests with various ordinary long-lived lamps of high wattage, including a 500-watt projection lamp, proved them to be deficient in ultraviolet radiation, and infected hairs could scarcely be differentiated from normal ones by their use.

Two thicknesses of 3/16-in. Corning Heat Resistant Red Purple Ultra glass No. 587 are used as a filter.

Sun Bronchitis. Abst. in Jour. A. M. A. 99:6:517, August 6, 1932, from Munchener medizinische Wochenschrift, Munich, 79:795 (May 13), 1932.

Klare points out that the different constitutional types react differently when exposed to the sun. Whereas dark people generally feel no ill effects from solar irradiation, light persons often show unfavorable reactions. That these reactions may become manifest even in the form of febrile bronchitis, the author observed on numerous children who underwent heliotherapy. The children in whom this form of sun bronchitis develops usually are the exudative lymphatic children. They are usually of light complexion, but of especial importance seems to be also a slight reddish tone in the color of the hair. The skin of these children reacts to sunlight exposure not with pigment formation but rather with inflammation and burning. However, it is not so well known that the irritation by the sunlight may also cause an inflammation of the mucous membrane of the upper respiratory passages. The cause of this reactive inflammation is as yet not fully understood, but the author thinks that it may be due to the decomposition of proteins. In the conclusion he points out that in children with exudative lymphatic diathesis exposure to sunlight should be done with great caution. He considers this warning necessary particularly at the present time, when natural and artificial heliotherapy is often employed without discrimination.

Tuberculosis. In Arch. of Surg., 25:3:613, September, 1932.

Specificity of Light Action in Experimental Tuberculosis.—Luce-Clausen and Bayne-Jones repeated, with certain minor variations, earlier experimental work of Phelps in 1930, and obtained diametrically opposite results. They found that guinea-pigs inoculated with a measured dose of tubercle bacilli and irradiated daily with the band of ultraviolet light (from 320 to 380 millimicrons) which Phelps claimed was specific, lived no longer than control animals kept in complete darkness. Infra-red radiation (from 720 to 1,120 millimicrons) used on a third group of animals, was apparently deleterious, as they did not live as long as the control group. Pathologically, the lesions of the three groups were identical in appearance.

(Ed. Note.—There is as yet no uncontroverted evidence that any portion of the sun's spectrum has any specific effect on tuberculosis. It is difficult to separate the effects of heliotherapy on tuberculosis of the bone and joint from those due to rest, immobilization, adequate orthopedic care and other general factors.)

15. Luce-Clausen, E. M., and Bayne-Jones, S.: Am. Rev. Tuberc. 24:686 (December), 1931.

Ultraviolet Light in Ophthalmology. H. Rommel Hildreth, M. D., St. Louis, in Am. J. Ophthal., 15:10:925, October, 1932.

The most useful rays are in the neighborhood of 2,800 A. U. The treatment of ulcers of the cornea is the especial field for ultraviolet light. For some of these ulcers this therapy is remarkably beneficial.

From the Department of Ophthalmology, Washington Univ., St. Louis. Read at the third annual meeting of the Association for Research in Ophthalmology, New Orleans, May 10, 1932.

The mercury arc in a quartz tube meets the theoretical requirements in a source of ultraviolet light better than any other generator. Its spectral distribution of energy is such that the proportion of short waved ultra-

violet light is high, while the proportion of visible light and infra-red rays is low; that is, in comparison with the carbon arc. The mercury arc is, besides, far more consistent in operation and requires no adjustment; it can, moreover, be compactly built in a water cooled chamber, both these factors giving it additional advantages over the carbon arc.

Having selected the most desirable generator, the next step to be considered is how may the energy be applied to the eye? The most convenient method is by means of a system of quartz lenses, the burner and lenses so arranged as to form a projection lantern. With the affected eye at the focal point of the apparatus, one has a standard working distance. Within the lens system filters may be inserted and also variable shaped apertures so that the beam may approximate the configuration of the area requiring treatment.

The amount of visible light and radiant heat from carbon and mercury arcs is so great that the eye must be protected. This can be done conveniently by using filters that will eliminate glare and heat and still permit adequate transmission of the short ultraviolet range. Distilled water happens to be an excellent filter for the infra-red rays; and the Corning Glass Works of New York now make a glass known as Red Purple Corex A that transmits as much as eighty-five per cent of the energy at 3,000 A. U., fifty per cent at 2,800 A. U., and even ten per cent at 2,600 A. U. At this point there is a strong emission band in the mercury arc, yet this glass allows but a very small amount of visible light to pass. Thus the clinical use of ultraviolet light has been made much more comfortable with the removal of the intense glare that has always been so objectionable. Another glass known as Uviol Glass has also been put on the market for such purposes, but it absorbs all the short-waved ultraviolet light; consequently, the time of exposure has to be increased to a point where it is impracticable.

The technic employed in operating the writer's mercury arc lamp is as follows:

The patient is seated at the glass topped table with the head in the chin rest. The lamp is started and for about four minutes burns at a constant voltage. The glare filter is in place, and, in addition, there is a clear glass filter to block the ultraviolet rays until the moment of treatment. With the diaphragm cut down, the light beam is brought to a focus upon the lesion, and then the diaphragm is opened, so that the beam includes slightly more than the area involved. The clear glass filter is now removed for the period of treatment which is accurately timed by an interval timer or laboratory clock.

If instead of the mercury arc the carbon arc is to be used with the apparatus, the technic is similar. The carbon arc must, however, be closely watched and frequently adjusted in order to insure a constant intensity of radiation. This varies considerably when measured by such an instrument as the Burt photometer, but the average intensity during the exposure is satisfactory for clinical purposes.

In general the duration of exposure is fifteen seconds when using the writer's apparatus. This dosage was adopted when it was found to be just suberythemal for the average, moderately fair skin, tested on the under surface of the arm. Applied to the human cornea, it always produced a mild to moderate photo ophthalmia within six to eight hours, which is the classical reaction. A sixty-second exposure of the human cornea produced no harmful local effect, but the subjective reaction was very unpleasant. Rabbits' corneas showed no permanent damage either clinically or histologically even after a five minute exposure.

It has been shown that exposures during a twenty-four hour period are cumulative, so that repeated treatments on the same day are unnecessary. After three days the local biological effect has worn away. It has, therefore, been the writer's practice to use a maximal dose (suberythemal) every three days. Theoretically, this plan would seem to be the best, and in practical application it has proved satisfactory.

The duration of exposure required by the carbon arc when using the same glare filter but a larger water filter (because of the greater proportion of heat), is longer than the fifteen-second dose of the mercury arc. If the carbon electrodes are cored with metals the intensity of the short-waved ultraviolet rays will be altered; nor is the intensity the same with the two types of current, direct or alternating.

A simple method of measuring the intensity of ultraviolet light is that described by Janet Clark who uses as a photosensitive substance a specially prepared zinc sulphide powder made into a paste and spread on a quartz plate. It has the property of re-acting only to the spectrum between wavelengths of 2,500 and 3,200 A. U., which closely approximates the spectral band in which we are interested.

There are adequate reports of clinical results in the ophthalmic literature to furnish evidence of the value of ultraviolet light, but in order to round out this paper the following three brief cases are appended. These cases have been chosen not in the spirit of over-enthusiasm but because of the apparent decisiveness of the action of ultraviolet light.

Laryngeal Tuberculosis. Some Experiences and Observations. Richard Wallace Wilkinson, M. D., Washington, D. C., in Arch. Otolaryng., 16:3:331, September, 1932.

Heliotherapy has for some time been a popular treatment in laryngeal tuberculosis and holds its place as an effective therapeutic method. Sorgo in 1904, and recently Stafford, Fisher, Strandberg and Ryan reported their results and advocated its use. The solar laryngoscope which is used for this treatment consists of an arrangement of mirrors which reflect the sun's rays into the larynx. This can be carried out by the patient himself or a nurse, but always under the guidance of the physician in order that the larynx will not be over-treated. Recently good results have been reported by Schreyer, Moore and others who are using the Wessely radiation machine, which is a modified carbon arc light that emanates artificial actinic rays. This method has a readily recognized advantage over sunlight. There is grave objection to subjecting the patient to direct laryngoscope daily for such exposures as has been advocated.

CONCLUSION

The following are the conclusions drawn from this series of studies of laryngeal tuberculosis:

1. The treatment of laryngeal tuberculosis offers encouraging results in many or most early cases.

2. It should be brought to the attention of the general practitioner that every patient with pulmonary tuberculosis should have a laryngeal examination at frequent intervals; one should not wait for laryngeal symptoms.

3. The treatment is best carried out in a sanitorium where the pulmonary and laryngeal condition may be under careful surveillance.

4. The most effective treatment today is electrocauterization, vocal rest and sunlight or modified sunlight.

Milk Irradiated by the Carbon Arc Lamp. A Clinical and Laboratory Study of Rickets. A. F. Hess, M. D., and J. M. Lewis, M. D., New York, in Jour. A. M. A., 99:8:647, Aug. 20, 1932.

CONCLUSIONS

1. Pasteurized milk was activated by means of carbon arc rays, the radiant energy being carefully controlled and measured. It was found that sixteen seconds' exposure was sufficient to render the milk highly antirachitic.

A clinical test of this product in the prevention and cure of infantile rickets demonstrated that it is a highly effective antirachitic agent which can be relied on. Less than one quart daily sufficed to protect even Negro infants.

The great advantage of using activated milk, both fluid and dry, in the prophylaxis of rickets is that this measure furnishes an automatic method of therapy and likewise provides calcium and phosphorus.

2. Laboratory tests of this milk showed that it contained a comparatively small number of antirachitic units as judged by the standard rat assay. In view of the excellent clinical results, it is evident that the established method of assay cannot be relied on to appraise the value of irradiated milk for infants. This discrepancy in standardization was found also to hold true for tests of milk from cows which had been fed irradiated yeast ("yeast milk").

3. The indications for various antirachitic agents are discussed and appraised of (1) irradiated milk, fluid and dry, (2) "yeast milk," (3) cod liver oil, (4) viosterol, (5) irradiated yeast, (6) direct ultraviolet irradiation. Some of these measures are of value in the prevention and others for the cure of rickets, some for urban and others for rural communities. The use of irradiated fluid milk probably will be restricted to cities.

Amount of Ultraviolet Radiation Needed to Cure Rickets with Respect to Area of Skin Exposed. Arthur Knudson, Ph.D., Albany, N. Y., in Amer. J. Dis. Children, 44:3:524, September, 1932.

That rickets is a disease that is readily prevented or cured by ultraviolet radiation from either artificial sources or sunshine is evident from the numerous investigations reported on this subject. Information as to the amount of radiation needed to cure rickets, with respect to the area exposed is, however, very meager. Investigations made in connection with co-workers indicated that only a small amount of radiation is necessary for the cure or prevention of rickets in rats. When one considers that the rat is covered for the most part with fur, the amount of radiation that reaches the surface of the skin is no doubt much reduced. Maughan and Dye showed that in chickens only a small amount of radiation is necessary to cure rickets and that the area covered by the feathers receives very little or perhaps none of the beneficial rays.

It seems desirable, therefore, to determine whether any radiation is effective through the hair of the rat and to compare results with exposure of the skin directly. It was also planned to see how much of an area of skin it is necessary to expose to obtain complete healing of rickets and to determine whether there is any relationship between the area exposed and the time of exposure.

COMMENT

These experiments emphasize how little radiation passes through the hair of the rat and that apparently most of the ultraviolet irradiation is effective through the ears and feet and perhaps to some extent the tail. That the effective irradiation is a very small area when the whole rat is irradiated is brought out by the fact that irradiation of one-fourth square inch of the skin of the rat produces greater healing of rickets than exposure of the whole animal for the same length of time.

The average weight of the rats that were healed of rickets by irradiation of one-fourth square inch of skin daily for twenty minutes was about 70 Gm., and according to recent work of Diack on the determination of the surface area these rats would have a total surface area of about 120 square cm. The area irradiated is equal to 1.55 square cm., so that this amounts to one-eightieth of the total surface area. One-eightieth of the total surface area is capable, therefore, of absorbing sufficient of the rays to heal rickets in a rat when exposed to a General Electric Sun Lamp for twenty minutes daily at a distance of three feet. This is an extremely small amount of ultraviolet radiation when measured in calories. Gordon and Benford reported that the total energy flux below 3,200 A. U., for the bare type S[1] lamp at a distance of one meter is about 20 microwatts per square centimeter. A reflector as used in the Sun Lamp may increase this value 2 to 5 times, so that a value of approximately 100 microwatts per square cm. is perhaps a fair figure to use for the energy below 3,200 A. U. The results reported by Forsythe, Barnes and Easley indicate that energy below 3,200 A. U. would be a little more than 100 microwatts per square cm. Our exposures were carried out at a distance of 36 inches, and the foregoing figures are for one meter or 39 inches; so that we increase the energy to 117 microwatts per square cm. Since we irradiated 1.55 square cm., the energy reaching this area would be 182 microwatts or, in round numbers, 200. The total exposures amounted to 420 minutes (20 minutes daily for 21 days), and therefore the total ultraviolet energy below 3,200 A. U., reaching the skin of the rat would be 84,000 microwatt minutes or 0.084 watt minutes. This amount of energy expressed in terms of small calories is 1.2. When one realizes that the oxidation of 1 mg. of carbohydrate in the body produces four small calories, one can appreciate the small amount of ultraviolet energy needed to cure rickets in the rat.

On the assumption that a similar relationship holds for human beings as has been shown in the case of the rats, it is apparent that much smaller amounts of ultraviolet radiation will be effective in preventing or curing rickets in children than has heretofore been appreciated. It will also be realized that sufficient ultraviolet radiation may be obtained from either artificial or natural sources even though the whole body is not exposed.

The fact that the amount of radiation needed to prevent or cure rickets depends on the area exposed and that the total irradiation can be given in a relatively few divided doses is of considerable value in the irradiation of patients in institutions. It permits of irradiation being given at weekly intervals and considerably shortens the time of exposure when the whole body is irradiated.

CONCLUSIONS

Very little, if any, irradiation is effective through the hair of the rat.

Irradiation of one-fourth square inch of the skin of the rat for twenty minutes daily at a distance of three feet to a General Electric Sun Lamp cured rickets within three weeks. This area is about one-eighth of the total surface of the area of the rat. The total of ultraviolet energy below 3,200 A. U., needed to cure rickets in the rat is not more than 1.2 small calories.

The amount of irradiation needed to cure rickets is directly proportional to the area of the skin exposed.

The total irradiation that was found by daily exposure

to produce complete healing can be given in as little as two exposures ten days apart.

Rickets. Comparative Value of Several Light Sources for Cure and Prevention. Arthur Knudson, Ph.D., Albany, N. Y., in American J. Dis. Children, 44:3:531, September, 1932.

COMMENT

The experiments with the Victor Uviarc demonstrated that only a very short exposure is necessary to prevent or cure rickets. Koch, Koch, Falk and Lemon reported the prevention of rickets with a similar source of radiation and stated that with the Cooper-Hewitt Uviarc operating at 70 volts, an exposure of 30 seconds per day at two feet prevented rickets. Considering that their radiation was given without a reflector, their results are in fair agreement with ours.

The tests with the General Electric Sun Lamp showed that it is about twenty to thirty times weaker source of radiation than the Victor Uviarc. Nevertheless, these tests reveal significant amounts of antirachitic potency from this type of lamp. Koch, Koch, Falk and Lemon found that only sixty seconds exposure per day at a distance of two feet is necessary to prevent rickets. This is about one-third of the dosage we found necessary to prevent rickets in rats. Maughan and Dye found that an exposure of at least four minutes per day at thirty inches from General Electric Sun Lamp was necessary to prevent rickets in chickens. This is a fairly good agreement with our results in rats.

The results of exposure to direct sunlight showed that in Albany winter sunlight has much less antirachitic effect than summer sunlight. It was not possible to expose the rats a sufficient length of time in midwinter to obtain a cure of rickets. On the other hand, it was found that 270 minutes per day was almost sufficient to prevent rickets in midwinter. If we take the relationship between cure and prevention of rickets of 4:1 as observed with the General Electric Sun Lamp, CX lamps and summer sunlight, then it would theoretically require about 1,080 minutes per day of midwinter sunshine to cure rickets in rats. This amount of radiation it would, of course, be impossible to obtain.

Taking 105 minutes per day as the average amount of sunshine to cure rickets in midsummer and 1080 minutes (as calculated) per day to cure rickets in midwinter, it is evident that the antirachitic effect of midsummer sunshine is approximately ten times greater than that of midwinter sunshine. From our figures on preventive experiments, we obtained a similar relationship between midsummer and midwinter sunshine. Tisdall and Brown, in studies on seasonal variation of sunshine in Toronto, reported that the antirachitic effect of sunshine in April and May is approximately eight times as great as during December and January. A study of Tisdall and Brown's data indicates that the antirachitic effect of midwinter sunshine in Toronto is about the same as that of Albany.

Observations of Stein and Lewis and Lewis, Frumes and Stein indicate that Colorado sunshine contains a much higher concentration of biologically effective ultraviolet light. Their results show that winter sunshine is about equally as effective as summer sunshine, and that an exposure of less than ten minutes per day will prevent rickets in rats. Experiments of Mayerson and Laurens show that sunshine in New Orleans is very effective in preventing rickets. They found that three minutes exposure per day during the month of June prevented rickets, and that with an exposure of fourteen minutes per day in December and January a mild degree of rickets developed. While these observations show that summer sunshine in New Orleans is much more effective than winter sunshine, there is nevertheless a somewhat similar relationship between the antirachitic potency of summer and winter sunshine as has been found to be the case in Albany.

That incandescent filament lamps with Corex D bulbs are pathologically effective is evident from our observation as well as those of others. Our results indicate that the General Electric Sun Lamp with type S1 bulb is about a hundred times more potent than the 500 watt CX lamps. Observations with the CX lamps are made without reflectors and their potency can be increased somewhat with a good reflector. That such a weak source of ultraviolet radiation is effective therapeutically is shown by the recent report of Gerstenberger and Horesch on the cure of infantile rickets with the CX lamps. They found that rachitic infants were cured of rickets in about ten weeks times when exposed twelve hours per day to the 500 watt CX lamp in an aluminum reflector at a distance of 5½ feet above the bed level.

CONCLUSIONS

A comparison has been made of the antirachitic potency of several light sources including that of sunlight in the vicinity of Albany. Although these experiments have been carried out on rats, nevertheless, the relative data can be applied to an assay of antirachitic potency for the child. In view of the fact that the animal's body is covered by hair, it would seem that the length of exposure necessary to cure or prevent rickets in children is less than in laboratory animals. The antirachitic values of different light sources for cure and prevention of rickets are given in table 3.

TABLE 3

	Minimum Light Exposures	
Light Source	*For Cure of Rickets*	*For Prevention of Rickets*
Victor Uviarc operating at 70 volts	60 sec. @ 3 ft.	20 sec. @ ft.
General Electric Sun Lamp Type S1 bulb	30 min. @ 3 ft.	7 min. @ 3 ft.
Sunshine June and July 1930	120 min.	30 min.
Sunshine June and July 1931	90 min.	20 min.
Sunshine Jan. and Feb., 1931	1080 min.*	270 min.
CX Lamp, 60 watt	24 hours @ 9 in.	24 hours @ 18 in.
CX Lamp, 500 watt	11 hours @ 18 in.	11 hours @ 36 in.

*Calculated dosage.

Note.—Since this paper was accepted for publication, tests have been completed on the S2 Mazda sunlight lamp of the General Electric Company. This lamp is similar in construction to the S1 lamp, except that it has a smaller bulb and the output is 130 watts, while the Type S1 lamp is 315 watts. Tests on the S2 lamp in the Model K sun lamp fixture were carried out similar to the tests with the S1 lamp. They show that the S2 lamp is from one-fifth to one-sixth as potent a source of ultraviolet radiation as the S1 lamp for the cure and prevention of rickets in rats.

Friel Ionization with Zinc as Method of Treatment of Chronic Otitis. Abst. in Jour. A. M. A., 99:3:273, July 16, 1932, from Russkaya Oto-Laryngologiya, Leningrad, 24:487 (number 6), 1931.

Pushkin describes a method of iontotherapy for chronic otitis first recommended by Friel in 1921. The ear, which serves as an electric cell, is filled with a solution consisting of 0.5 per cent zinc sulphate, 5 cc. of glycerin and 100 cc. of distilled water. The positive

zinc electrode is placed in this solution through a small ebony funnel (the tip of the electrode just 0.25 cm. above the bottom of the tip of the funnel), and the indifferent negative electrode, insulated in tin foil and well protected, is tied to the shoulder or arm. The electric current is transformed through a rheostat. There must be a regular flow of current with a potential of from 40 to 50 volts and an intensity of not more than 3 milliamperes. Most of the treatments consisted of a current of 2 milliamperes, and the current was applied for from ten to fifteen minutes. The average number of treatments was three. The author treated forty patients this way and concludes that ionization offers the best method for the treatment of the infectious process and that its influence is directly on that process. The action seems due to the nascent state of the medicaments, which come in close contact with the diseased tissue and gradually coagulate it. The action of the ions is specifically on the pathologic tissue and reaches parts of the ear that are inaccessible by other methods of treatment; the electric current at the same time influences the cellular tonicity. This method of treatment is recommended by reason of its rapidity and its efficacy.

Colon Irrigation in the Treatment of Mental Disease. Harold K. Marshall, M.D., and Charles E. Thompson, M.D., in New England, M. J., 207:10:454, Sept. 8, 1932.

Read at the annual meeting of the Mass. Medical Society before the Section of Radiology and Physiotherapy at Boston, June, 9, 1932.

At the Gardner State Colony, treatment of mental patients by colonic irrigation methods was inaugurated in May, 1930. A large number of patients have been under treatment by this method. Although this work has not been completed, it has been possible to draw conclusions of interest to psychiatrists as well as to internists and surgeons.

In our experience cases of manic depressive psychoses experiencing a manic episode show a quick return to normal mentality when the colon is kept well irrigated. This we attribute to three factors: Removal of toxic products from the colon, pointed out by Jamieson; relief of the dehydrated condition of the tissues, and relief of acidosis. Most manic depressive cases are constipated, dehydrated and acidotic to a varying degree from semi-starvation due to neglect previous to admission. Regarding high blood pressure it has been interesting to observe that hypertension does not appear to be an etiologic factor in the production of manic phases of a manic depressive psychosis. We have noted that a fall in blood pressure takes place concomitantly with the return of normal mental stability, but that a rise of blood pressure subsequently does not provoke a psychotic episode.

In dementia praecox cases, results have been outstanding from a psychiatric standpoint. Physically, however, improvement is generally noticed and, as the colon is not permitted to become congested, many who are inclined to be objectionable in their habits become less so. Dementia praecox cases are certainly quieter and cleaner under this type of treatment. Other types of mental disorder show improvement in mental and physical health.

Surgically it has been observed that colon irrigation is of value in the preoperative preparation of patients prior to laparotomy. Stagnate intestinal contents and gas-producing material have been removed to a considerable extent with the result that convalescence is markedly more comfortable and the usual abdominal distention with resulting pain has been absent. Our consulting surgeon, Dr. Lowell, equally noted beneficial results after this treatment was inaugurated.

Medically it has been observed that in patients with high blood pressure a rapid fall of pressure takes place amounting to 20 to 30 mm., of mercury before completion of an irrigation, the time of giving of which averages about forty-four minutes. This fall in blood pressure is not prolonged, as it rises within twenty-four hours to its former height. However, after a period of daily colon irrigation a gradual fall of the cystolic pressure takes place until that pressure is maintained at about 20 to 40 mm. of mercury below the former high blood pressure. This drop in the blood pressure obtained during the first irrigation suggests that cases of hypertension with cerebral hemorrhage and cases of eclampsia might be helped by the judicious application of this treatment.

Approximately 200 colon irrigations are being administered monthly at the Gardner State Colony. No untoward results have been noted in any case.

CONTRAINDICATIONS

Inflammatory intraabdominal conditions with or without pus; malignancy or ulceration of the rectum; incompetent ileocecal valve; hemorrhoids during an acute exacerbation are contraindicated.

SUMMARY

Colon irrigation does not appear to exert any specific action; it merely aids in combating a number of abnormal conditions. By cleaning out the colon the system is afforded relief from toxic products and an unnecessary burden is removed from metabolic processes; by its mechanical cleansing action cleanliness of habits is promoted, by the disruption of fluid from the colon, which takes place during treatments, dehydration is relieved.

From our experience this treatment produces a quicker return to mental stability in our opinion in favorable cases. In active cases sedation is unquestionably obtained, strikingly shown by a reduction in the number of wet sheet envelopments required, which prior to this form of treatment numbered from anywhere up to 500 monthly. Since the use of colon irrigation, wet sheet envelopments have fallen to less than sixty monthly and sometimes none at all. From the standpoint of the hospital, it is interesting to note that the destruction of mattresses, sheets and clothing has fallen off approximately 50 per cent.

Our results may be given as follows:

From June, 1930, to May 1st, 1932, we have given 5,468 colon irrigations averaging 44 minutes each to 191 different patients. This represents between one fourth and one fifth of our population which in round numbers is 1,350.

The Menace of Quackery to Physical Medicine. C. B. Heald, C.B.E., M.D., M.R.C.P., Physician Physical Medicine Department, Royal Free Hospital and British Red Cross Clinic; Consulting Physician Royal Air Force; in British M. J., No. 3740, page 512, Sept. 10, 1932.

The Ignoramus Quack.—The different types of ignoramous quackery can best be considered under the heads of (1) the medically unqualified practitioner, (2) the manufacturer, and (3) the medically qualified practitioner. Each of these classes presents a different kind of menace to the welfare of physical medicine.

The Unqualified.—I have placed the unqualified practitioner first, not because he constitutes the greatest menace, but because he constitutes the smallest and can be dismissed from our discussion in a few words. The unqualified practitioner is debarred by law from describing himself as a doctor of medicine and has other legal disabilities and difficulties.

The Manufacturer.—The manufacturer, before making or approving the advertisement of any apparatus, has a duty to the profession and to the public to satisfy himself that what he is putting forward conforms to certain criteria:

(a) Is the apparatus a genuine piece of apparatus properly assembled and capable of actually delivering the current or making the ray he claims for it?

(b) Is he prepared to submit the apparatus without obligation of any kind to the physical treatment department of some well-recognized hospital for unhurried investigation of its clinical effects and physical efficiency?

(c) Is he prepared, in the event of the report proving definitely disadvantages to any claims for the therapeutic value of the apparatus, to withdraw such apparatus, or such claims until fuller investigation or alteration of the apparatus makes claims and clinical effects reasonably consistent?

(d) Will he also agree not to advertise or sell to the public apparatus for treatment without a prescription from the medical attendant?

The Qualified.—Among the qualified are quacks of two kinds: Those who use electrical or physical apparatus themselves, and those who know nothing about physical therapy apparatus but send their patients on to the technicians for such treatment.

The medical practitioner who employs electrical or physical apparatus can by applying a short series of test questions to himself, find out quite likely whether he is in part or wholly a quack:

(a) Has he, as far as clinical and theoretical study can carry him, acquired an understanding of the physical nature and physiological effects of the apparatus he is employing?

(b) Is he truthful in his statements about the probable effects of the currents he employs, and does he avoid over-statement of their benefits and under-estimation of the failures?

(c) Does he only apply a current or a ray, or order a bath, after a thorough general medical examination of his patient?

(d) Does he select from the patients consulting him only those suitable for treatment?

(e) Does he avoid using one single apparatus for every type of patient?

(f) Does he give part of his time voluntarily to a hospital or a clinic where he can keep in touch will all branches of modern medicine?

A Suggested Solution.—My suggestion for the solution of this problem is the centralization in one department of all physical measures in a hospital. Physical medicine is found at present scattered through all branches of hospital service, both surgical and medical. Light treatment is perhaps given in the skin department, massages in the orthopedic department, and electrical treatment somewhere else. If all the physical treatment apparatus were grouped in one department the resulting centralization of effort and methods would be of benefit to the patient and of great educational value to the student. Moreover, if the heads of this department were recognized as likely candidates for appointment to the surgical and medical staff, there would be no difficulty in the medical profession.

Book Review

Hydrotherapy in Hospitals for Mental Diseases. Rebekah Wright, M.D., Hydrotherapeutist, Massachusetts Department of Mental Diseases; Member of Massachusetts Psychiatric Society, Member of New England Society of Psychiatry, Fellow of American Psychiatric Association, Member of International Society of Medical Hydrology. The Tudor Press, Inc., Boston, Mass., 1932.

The importance of a book dealing with medical hydrology cannot be overestimated. Unfortunately hydrotherapy is too often carelessly associated with spas and Turkish baths and appreciation of its therapeutic value is lost. Though primarily written as a presentation of hydriatic technique in a hospital for mental diseases, the book covers the ground so clearly and completely that its value is general.

The most careful thought and attention to detail has been given to the description of the many types of application and to what is exceedingly important—their individual reactions and therapy. The material is presented in four parts:—I and II for those who administer the treatments, III for the physicians who would prescribe hydrotherapy in hospitals for mental diseases and IV for superintendents or those who are interested in the planning and construction of departments. Illustrations and plans abound and one chapter is devoted to records and reports.

In short this in an invaluable book for all who are interested in the therapeutic value of water, be it student, nurse, technician or physician.

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